Owner's Manual

Regal Intensive Care Unit

- *Controlled Environment*
- *Temperature Controlled Air Flow*
- *Filtered, Re-circulated Oxygen Supply*
- *Built-in Heating/Cooling Systems*

New Model Number: **12019-01-NGFREP**

SSCI
Wheeling, IL 800 323 7366

Form No. 702718 Rev. A 03/05

WARNING: **Oxygen is a highly combustible gas. Avoid the use of open flames, smoking materials, or equipment capable of producing sparks in any area in which oxygen is being used.**

Inquiries should be addressed to **Suburban Surgical Co., Inc.**
Wheeling, Illinois 60090, USA

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Chapter 1 - General Information

Introduction

SSCI's Regal Intensive Care Unit has been uniquely engineered to provide a temperature and oxygen controlled environment for your most seriously ill patients. This versatile unit can accommodate one large animal or, with the addition of an easily-installed wire grill divider panel, two smaller animals simultaneously.

The unit controls temperature in two ways: by controlling air temperature, and by warming the floor with two separate, individually-controlled floor heaters. The continually re-circulating air flow can be warmed or cooled with the built-in heating system and refrigeration unit.

Oxygen concentration and flow volume are accurately controlled and continuously monitored on the control panel. Carbon dioxide is removed as the re-circulating air passes through an absorbent filter medium. To ensure your patient's comfort, an integral two-function thermometer/hygrometer digital readout displays the temperature and humidity inside the unit. External access ports allow you to change the IV supply without opening the compartment or disturbing the animal.

The unit is made of durable, easy-to-clean stainless steel, unaffected by moisture or temperature.

About this Manual

Every attempt has been made to insure that the information in this manual is correct and complete. SSCI, however, always welcomes our customer's suggestions for improvements to our products and associated publications.

Information and Safety Notices

Throughout this manual you will find text under the headings **Note**, ***CAUTION:***, and ***WARNING:***.

Notes

Under the **Note:** headings, you will be given additional information pertinent to the subject discussed in that paragraph or step.

> **Example:**
>
> Turn the Temperature Set Knob to 60° F. **Note:** Set the temperature even lower if your room temperature is 60° or lower.

CAUTIONS

Under the ***CAUTION:*** heading, you will be alerted to potentially hazardous conditions which, if ignored or mishandled, could result in minor injury to yourself or minor damage to the equipment.

> **Example:**
>
> ***CAUTION:*** **Unpacking, installing, and setting up the Regal Intensive Care Unit is not difficult. The unit is heavy, however, and we recommend that these operations be done by at least two people.**

WARNINGS

Under the ***WARNING:*** headings, you will be alerted to potentially hazardous conditions which, if ignored or mishandled, could result in major injury to yourself or severe damage to the equipment.

> **Example:**
>
> ***WARNING:*** **Oxygen is a highly combustible gas. Avoid the use of open flames, smoking materials, or equipment capable of producing sparks in any area in which oxygen is being used.**

Models

The model numbers for the SSCI Regal Intensive Care Unit are:

- New Model Number: 12019-01-NGFREP
- Former Model Number: 102830

Accessories

The following accessories increase the operating convenience of your Regal Intensive Care Unit. Find descriptions, pictures, and information on SSCI products and accessories in our current catalog, or on our website at www.suburbansurgical.com. To order accessories, refer to *Parts Ordering Procedure* on *Page 73*.

- Stainless Steel Mobile Base (Figure 1) - P/N 12024-00-NIDREJ
- Modular Cabinetry Base (Figure 2) - Refer to your SSCI Catalog for styles, colors, etc.

Figure 1. Stainless Steel Mobile Base

Figure 2. Typical Cabinetry Base

Safety

Oxygen Warnings

WARNING: **Oxygen is a highly combustible gas. Avoid the use of open flames, smoking materials, or equipment capable of producing sparks in any area in which oxygen is being used.**

WARNING: **Oxygen-in-use warning signs should be prominently displayed where the Intensive Care Unit is used, and outside of all entrance doors to the room.**

WARNING: **Do not place an animal that has been exposed to an explosive gas such as ether into the Intensive Care Unit.**

WARNING: **Do not attempt to use an oxygen concentration greater than 40% unless, in your professional opinion, it is absolutely necessary.**

Electrical Warning

CAUTION: **Before working on the electrical system, make sure the unit is Off and the electric power cord un-plugged.**

Sodalime Warnings

CAUTION: **Sodalime can cause burns to eyes and skin. Dust can cause irritation to skin and eyes on contact. Harmful if swallowed.**

CAUTION: **Use safety goggles or glasses, PVC or rubber gloves, and a nuisance dust mask when handling Sodalime.**

CAUTION: **Dispose of Sodalime waste and water rinses in accordance with local, state, and Federal regulations.**

CAUTION: **Wash your hands thoroughly after handling Sodalime.**

For complete information, refer to the Material Safety Data Sheet (MSDS No. 005213) included in the Appendix to this manual.

Fuel Cell Warnings

CAUTION: **Do not remove the fuel cell from the bag until ready to use.**

CAUTION: **Wear safety glasses when handling the fuel cell.**

CAUTION: **Avoid contact with the sensing surface.**

CAUTION: **The fuel cell contains lead, a chemical known to cause cancer, birth defects, or other reproductive harm.**

CAUTION: **Wash your hands thoroughly after handling the fuel cell.**

Cooling System Warnings

WARNING: **Do not attempt to work on or disassemble the cooling unit as it contains MP39 refrigerant gas under pressure. If service is required on the unit, call SSCI Customer Service at 1-800-323-7366, or a certified refrigeration serviceman.**

For complete information, refer to the Material Safety Data Sheet (MSDS GTRN-0006) included in the Appendix to this manual.

Care and Cleaning of Stainless Steel

Introduction

Stainless steel is steel alloyed with chromium to make it highly resistant to stain, rust, and corrosion. **Note:** This does NOT mean that stainless steel will *never* rust or corrode. Science has not yet developed a steel which is completely stainless or corrosion PROOF.

The type of stainless steel and finish selected by SSCI for the Regal Intensive Care Unit is the best available for the intended use.

Cleaning and Cleansers

The basic rule of thumb is to use the mildest cleaning agent that will do the job effectively. After cleaning, always rinse thoroughly with clear water, and dry completely. Frequent cleaning will prolong the service life of stainless steel equipment and will help maintain a bright, pleasing appearance. **Note:** NEVER power-wash the Intensive Care Unit.

Ordinary deposits of waste and fluids can usually be removed with soap and water. More stubborn deposits or tightly adhering debris may require harder scrubbing and possibly the use of commercial cleaning products acceptable for use on metal surfaces. When using any cleaning agent, rub in the direction of the polish lines or "grain" of the metal. For high luster finishes, use clean soft cloths or pads.

If especially rough cleaning is necessary, use "stainless steel" wool, nylon or plastic scrubbers. Test these scrubbers in an inconspicuous area first to be sure they do not mar or scratch the stainless steel finish.

Minor scale build-up and some hard water spotting may be removed by washing with vinegar, followed by a neutralizing rinse with clear water, and a thorough drying with a soft cloth. For heavy deposits of scale, 5% oxalic acid (use warm), 5-15% sulfamic acid, or 5-10% phosphoric acid may be used. Always follow with a neutralizing rinse of clean water and a thorough drying.

Deodorizing Agents, Disinfectants, and Sanitizers

The large selection of brands and combinations of chemicals available for deodorizing, disinfecting, and sanitizing is staggering. Select one or more agents for use in your facility only after weighing all the benefits claimed by each product. Too often this choice is made without adequate consideration of the effects these agents may produce on equipment or furnishings.

CAUTION: **Before selecting a chemical to employ in your facility, review label statements regarding use with metals (stainless steel). Always consult the chemical supplier if there are any doubts.**

Avoid prolonged use of chlorides (such as chlorine bleach), bromides, iodides, and thiocyanates on stainless steel surfaces as these chemicals will cause pitting, corrosion, and metal discoloration. Allowing salty solutions to evaporate and dry on stainless steel may also contribute to corrosive conditions.

In summary, select chemical deodorizers, disinfectants, and/or sanitizers only after weighing all possible benefits and known adverse effects.

Effect on Warranty

The warranty for this product is void if the care and cleaning instructions provided in this manual are not followed.

Cleaning Requirements

Clean the Intensive Care Unit exactly in accordance with the cleaning instructions provided in *Chapter 4* of this manual. *Failure to follow these instructions can void your warranty.*

SSCI Contact Information

SSCI Customer Service can be contacted via mail, telephone, or fax. The department is available from 8:30am to 5:00pm, Central Time, Monday through Friday. Closed holidays.

Address: Suburban Surgical Co., Inc.
275 Twelfth Street
Wheeling, Illinois 60090

Telephone: Illinois - (847) 537-9320, ext. 3518
Toll Free - 1-800-323-7366

Fax: (847) 537-9061

Web: www.suburbansurgical.com

Warranty

Suburban Surgical Company, Inc. warrants the original purchaser that our products are of the highest standards in material and workmanship. Our stainless steel components are guaranteed to last a lifetime assuming they are used as intended, properly maintained and cared for. Mechanical, electrical, electronic, hydraulic, and any product's devices carry a one year warranty.

Items purchased by Suburban Surgical Company, Inc. from other manufacturers and incorporated into our equipment are covered by the respective manufacturer's warranties.

Warranties will not apply if it is determined by Suburban Surgical Company, Inc. that the equipment became defective due to an accident, misuse, abuse, improper maintenance, or alteration. Warranty freight charges are covered for the first year only.

Notes:

Chapter 2 - Description of Components

WARNING: **Oxygen is a highly combustible gas. Avoid the use of open flames, smoking materials, or equipment capable of producing sparks in any area in which oxygen is being used. Before servicing or performing maintenance on this equipment, make sure the oxygen supply is turned off at the source.**

Overview

The sections in this chapter describe the major components in the Regal Intensive Care Unit:

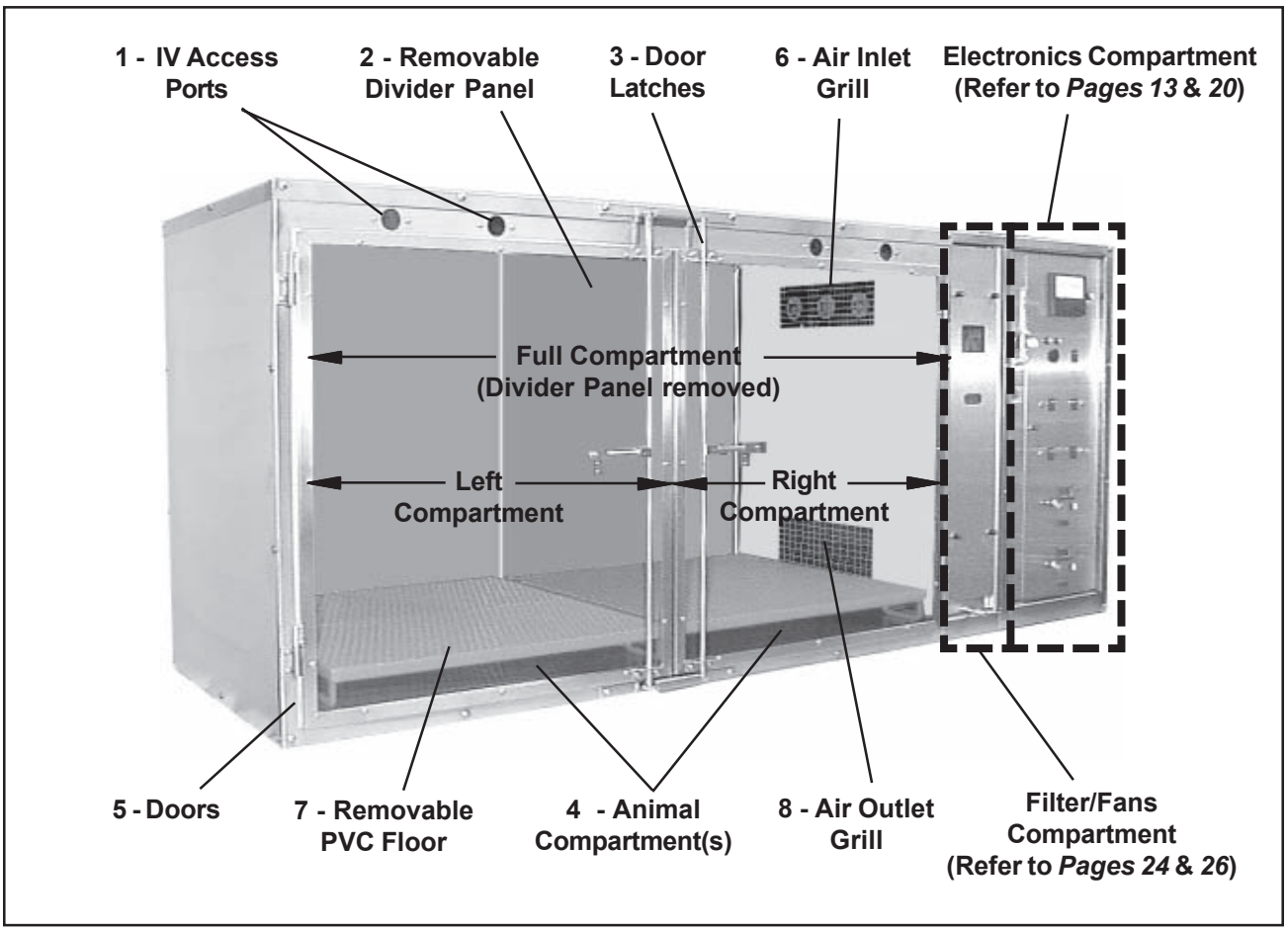

Figure 3. Components on the Front of the Intensive Care Unit

Intensive Care Unit, Front

(Figure 3)

1 - IV Access Ports

Four IV access ports (Figures 3 and 4), two for each half-compartment, are provided to allow you to change the IV supply without opening the compartment or disturbing the animal. These ports can also be used for lines to electronic monitoring equipment.

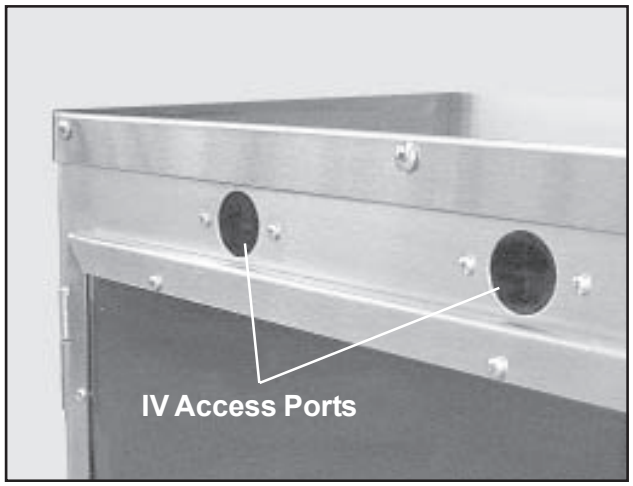

Figure 4. IV Access Ports (Left Side)

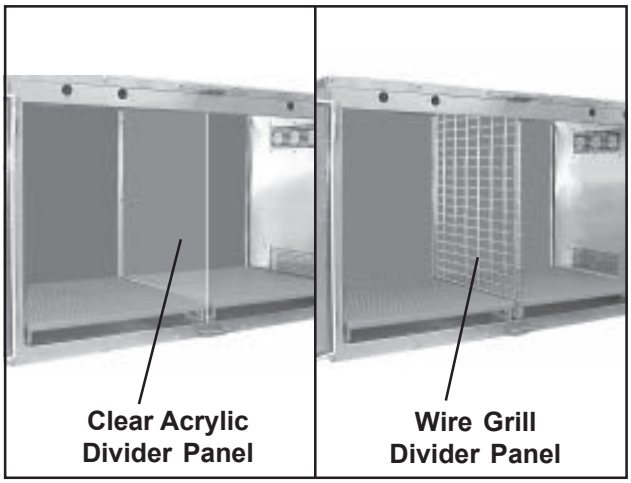

Figure 5. Removable Divider Panels

2 - Removable Divider Panels

Two removable divider panels (Figures 3 and 5) are supplied with the unit: a clear acrylic divider, and a wire grill divider. Only one can be installed at a time. The dividers are easily installed and removed, and, when installed, split the compartment into two half-compartments. The two half-compartments have individually-controlled floor heaters, however, they share the same oxygen supply, heating, and cooling.

The only purpose of the clear acrylic divider is to reduce the size of the compartment to minimize oxygen usage. **Always use the wire grill divider if animals are present in both compartments.**

WARNING: **Never place an animal in the left compartment if the clear acrylic divider is being used. This divider creates an effective seal, and prevents the flow of air into the left compartment. If this divider is in place, an animal in this compartment can easily suffocate.**

3 - Door Latches

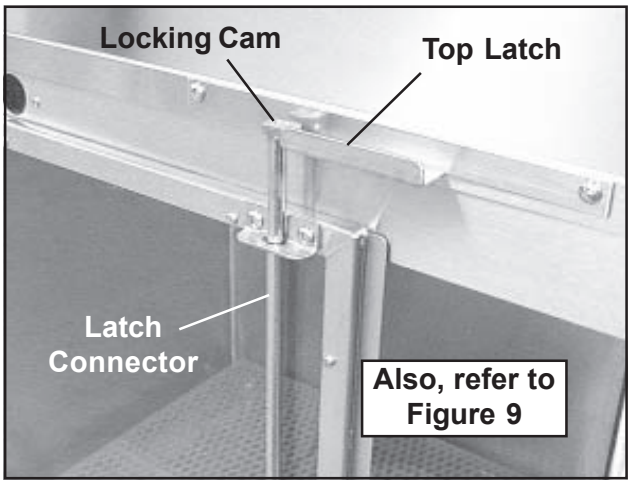

Figure 6. Door Latches

Each Intensive Care Unit door is held closed by a latch connector and one top and one bottom latch (Figure 6). As the handle is rotated, cams at the ends of the latch connector turn to engage or dis-engage the top and bottom latches to lock or unlock the door. For more information, refer to *Opening and Closing the Doors* on *Page 48*.

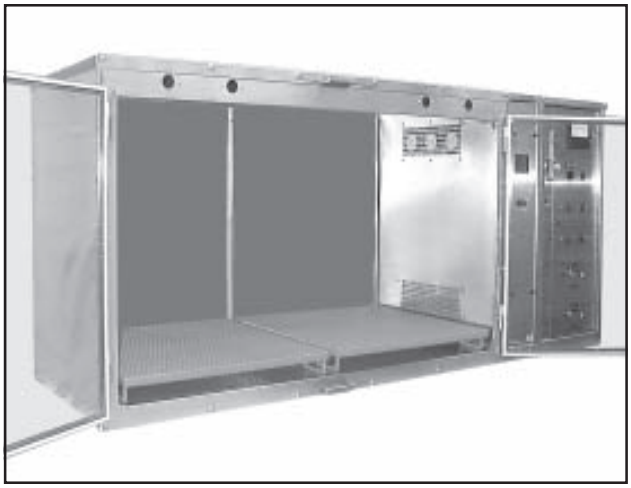

Figure 7. Full-size Animal Compartment

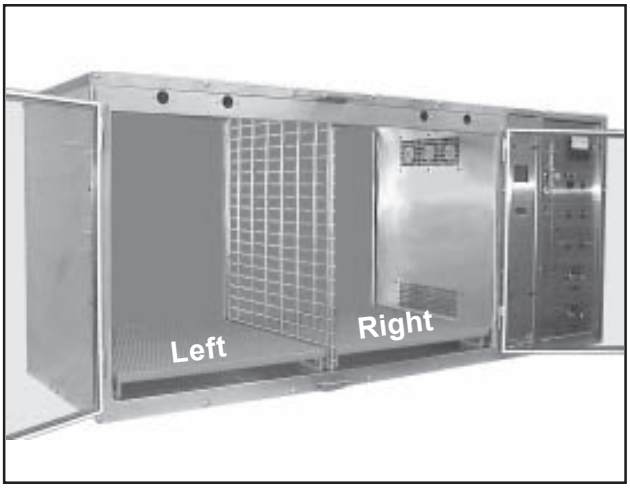

Figure 8. Half-size Animal Compartments

4 - Animal Compartment(s)

Figure 7 shows the Intensive Care Unit with no divider panel installed, thus forming one full-size compartment. Figure 8 shows the unit with a divider panel installed and forming two half-compartments. Each half-compartment has an individually-controlled floor heater, however, they share oxygen supplies, heating, and cooling. Approximate compartment dimensions are shown in Table 1.

Compartment	Height	Width	Depth
Full-size	33.875-in. 86.04 cm.	57.25-in. 145.41 cm.	28-in. 71.12 cm.
Half-size	33.875-in. 86.04 cm	28.5-in. 72.39 cm.	28-in. 71.12 cm.

Table 1. Compartment Dimensions

5 - Doors

The full-size compartment has double-doors without a center post which would impede movement of an animal into and out of the compartment. With a divider panel in place, each half-compartment is served by its own door. The clear acrylic doors give you a full, unobstructed view of your patients at all times. Rubber gaskets on all four sides of both doors provide leak-proof seals. For more information, refer to *Opening and Closing the Doors* on *Page 48*.

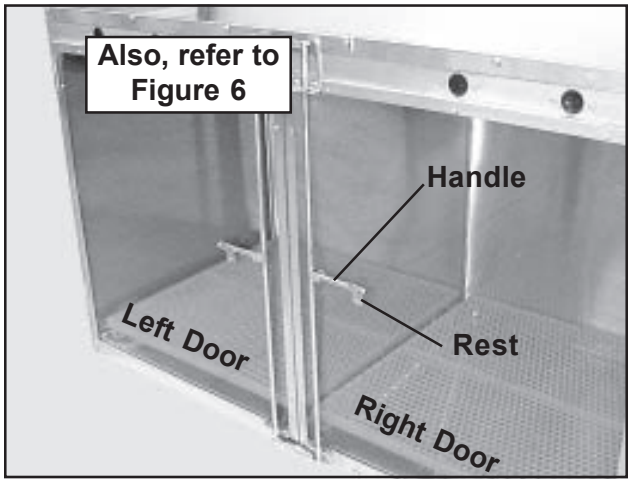

Figure 9. Doors and Latches

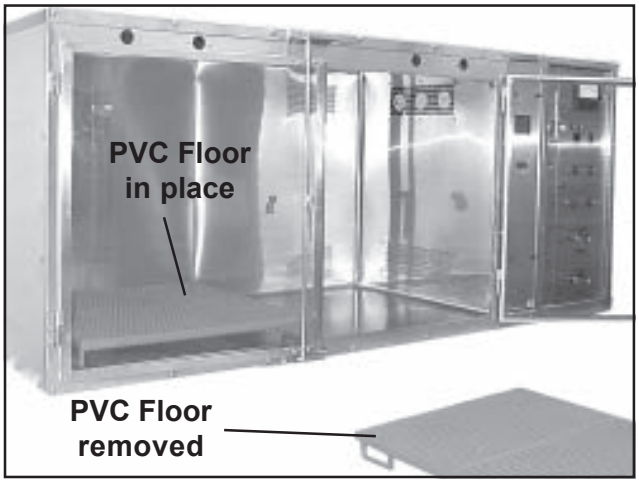

Figure 10. Removable PVC Floors

6 - Air Inlet Grill

Three circulating fans behind this grill supply air to the animal compartment (Figure 3). This opening is the entrance port for warm air, cool air, and oxygen into the animal compartment.

7 - Removable PVC Floor

Two orange, PVC-coated, expanded metal floors (Figures 7 and 10) are provided with the Intensive Care Unit to give animals softer, dryer, warmer, and more comfortable resting places. They allow the animals to rest three-inches above the compartment floor so they stay clean and dry. The PVC floors are easily removed for cleaning (refer to *Cleaning the Removable PVC Floors* on *Page 63*).

8 - Air Outlet Grill

After circulating through the animal compartment, air leaves the compartment through this grill (Figure 3) and into the filter/fans compartment. The air then passes through a filter, a chiller, a heater, and then a pan of Sodalime absorbent which removes the animal's respiratory carbon-dioxide.

Electronics Compartment, External

(Figure 11)

The following section gives you detailed information on the components found on the outside of the electronics compartment.

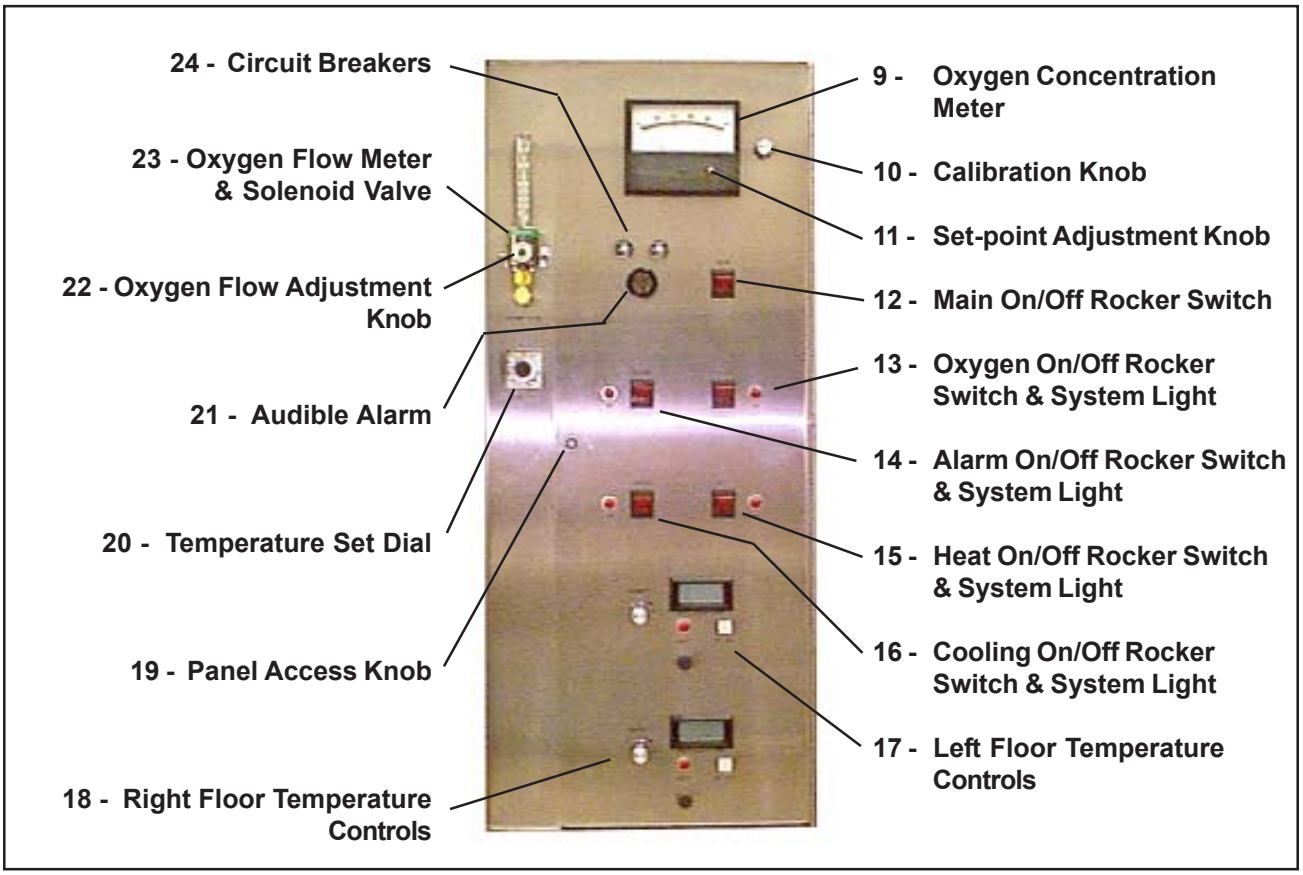

Figure 11. Electronics Compartment, External

9 - Oxygen Concentration Meter

The oxygen concentration meter (Figures 11 and 12) allows you to set the desired oxygen concentration in the animal compartment, and also displays the current concentration. There are two needles on the meter. The red needle indicates the current set-point. The black needle indicates the actual oxygen concentration. The red set-point needle can be adjusted to the desired concentration by turning the set-point adjustment knob. The black calibration needle can be adjusted using the calibration knob. For more information, refer to *Using Oxygen* on *Page 51*.

10 - Calibration Knob

The calibration knob (Figures 11 and 12) permits you to calibrate the black calibration needle in the oxygen concentration meter to a setting of 20.5% (the percentage of oxygen in atmospheric air) when you first start up the Intensive Care Unit. For more information, refer to *Using Oxygen* on *Page 51*.

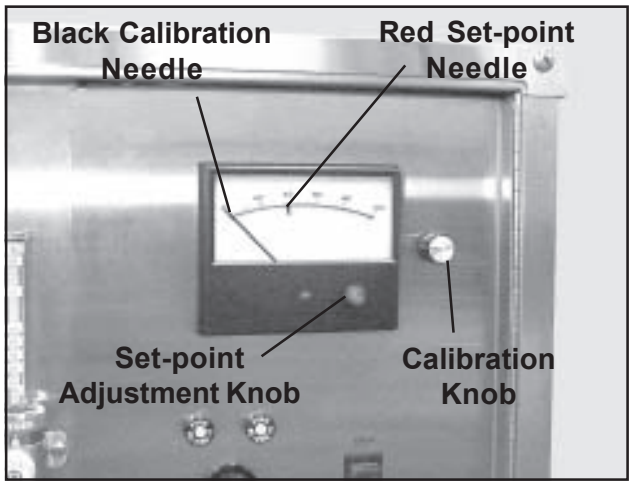

Figure 12. Oxygen Concentration Meter and Controls

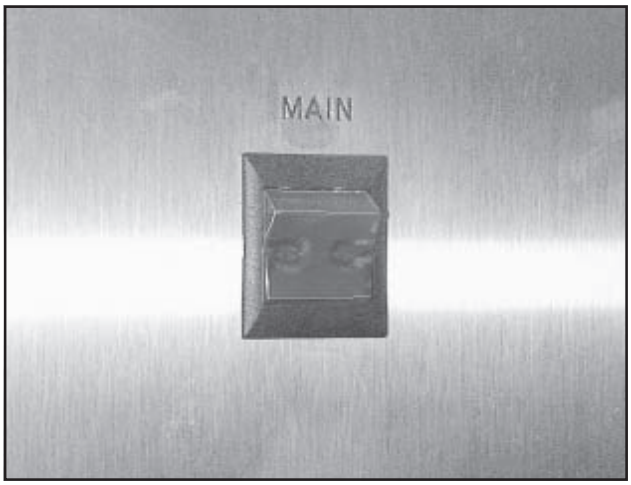

Figure 13. Main On/Off Rocker Switch

11 - Set-point Adjustment Knob

Turning the set-point adjustment knob (Figures 11 and 12) moves the red set-point needle in the oxygen concentration meter. This allows you to specify the appropriate oxygen concentration in the animal compartment. Once the desired level is set, the oxygen system will control the flow of oxygen to maintain this concentration. For more information, refer to *Using Oxygen* on *Page 51*.

WARNING: **Before using oxygen, please read *Oxygen Warnings* on *Page 3.***

12 - Main On/Off Rocker Switch

The main on/off switch (Figures 11 and 13) controls all electrical power to the unit. An amber light in the switch illuminates when the switch is On. This switch must be On for all other functions to operate. With this switch On, all functions are available including oxygen, alarms, heating, cooling, and floor heating. When the main on/off switch is turned On, the three circulating fans in the filter/fans compartment, and the ventilating fan in the electronics compartment start, and run continuously until the switch is turned to Off. For more information, refer to *Turning the Unit On and Off* on *Page 48*.

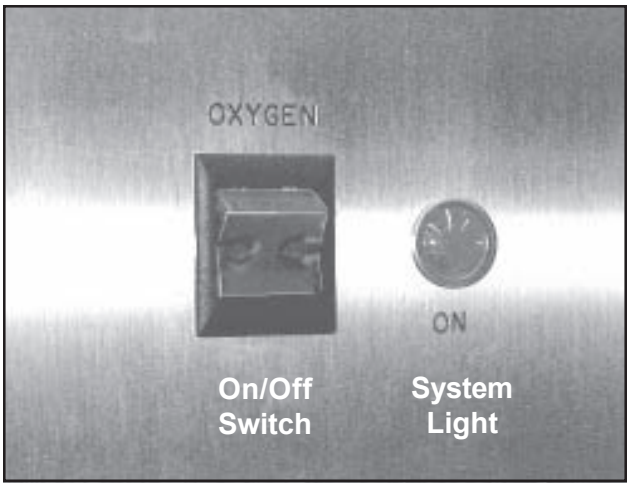

Figure 14. Oxygen On/Off Switch and System Light

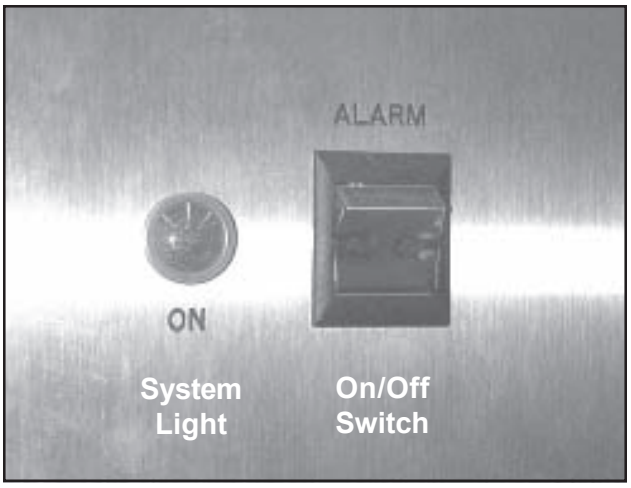

Figure 15. Alarm On/Off Switch and System Light

13 - Oxygen On/Off Rocker Switch & System Light

The oxygen on/off switch (Figures 11 and 14) controls the flow of oxygen. An amber light in the switch illuminates when the switch is On. With oxygen On, use the set-point adjustment knob to set the desired oxygen concentration in the animal compartment. When the red system light is On, it indicates that the system is operating. If the light is Off, it means that oxygen is not flowing, even though the system may be turned On. For example, the oxygen system might be On but not actually providing oxygen if the system senses that the oxygen concentration is currently at or above the level set on the oxygen concentration meter. For more information, refer to *Using Oxygen* on *Page 51*.

WARNING: **Before using oxygen, please read *Oxygen Warnings* on *Page 3.***

14 - Alarm On/Off Rocker Switch & System Light

The Intensive Care Unit includes an alarm system that warns you with audible and visual signals when there is a problem with the oxygen flow or concentration. The alarm system can be enabled or disabled by using the alarm on/off switch (Figures 11 and 15). An amber light in the switch illuminates when the switch is On. When the red system light is comes On and the audible alarm sounds, the Intensive Care Unit is in an alarm condition, and a problem exists in the oxygen system. For the alarm system to work, both the main and oxygen on/off switches must be On. For more information, refer to *Using the Alarm System* on *Page 55*.

15 - Heat On/Off Rocker Switch & System Light

The heat on/off switch (Figures 11 and 16) controls heated air to the animal compartment. An amber light in the switch illuminates when the switch is On. Once heat is turned on, use the temperature set dial to set the desired temperature. If the red system light is On, it indicates that the heating system is supplying heat. If the system light is Off, heat is not being sent to the compartment, even though the heat system may be On. This occurs, for example, if the temperature in the animal compartment is at or above the level set on the temperature set dial. For more information, refer to *Heating the Compartment Air* on *Page 53*.

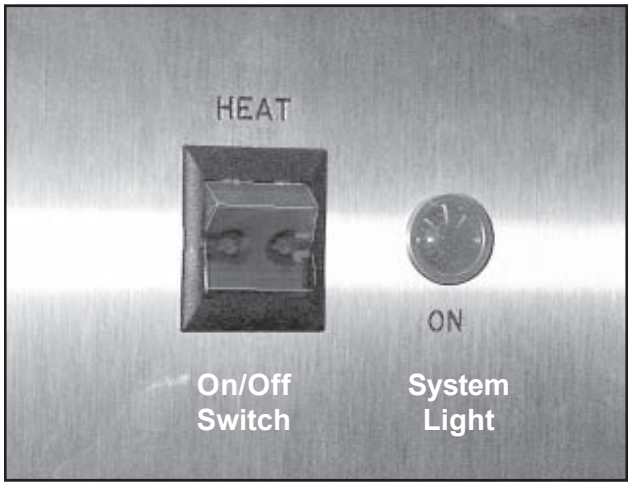

Figure 16. Heat On/Off Switch and System Light

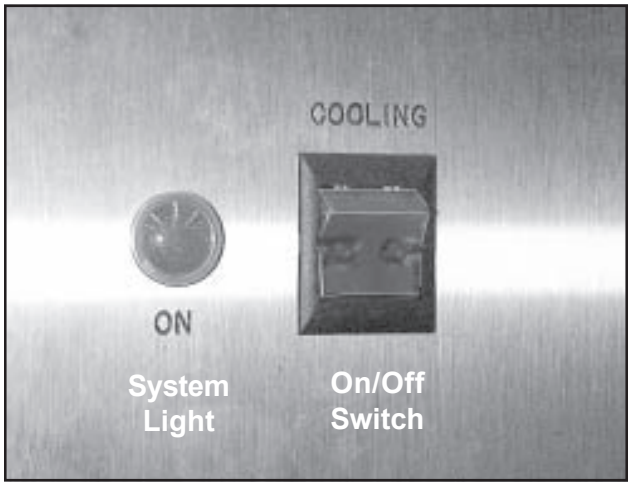

Figure 17. Cooling On/Off Switch and System Light

16 - Cooling On/Off Rocker Switch & System Light

The cooling on/off switch (Figures 11 and 17) controls cooled air to the animal compartment. An amber light in the switch illuminates when the switch is On. Once cooling is turned on, use the temperature set dial to set the desired temperature. If the system light is Off, cooling is not being sent to the compartment, even though the cooling system may be On. This occurs, for example, if the temperature in the animal compartment is at or below the level set on the temperature set dial. For more information, refer to *Cooling the Compartment Air* on *Page 54*.

17, 18 - Left & Right Floor Temperature Controls

The animal compartment floor has separate heaters for the left and right sides to provide localized heat control when the compartment is divided into two compartments. Two identical sets of floor temperature controls are provided (Figures 11 and 18). Each set consists of five items:

- On/Off Button
- System Light
- Temperature Control Knob
- Digital Display
- Fuse

On/Off Button

An amber light in the switch illuminates when the switch is On. To heat the full compartment, turn both right and left switches On. Use the temperature control knobs to regulate compartment floor temperature. For more information, refer to *Heating the Compartment Floor* on *Page 52*.

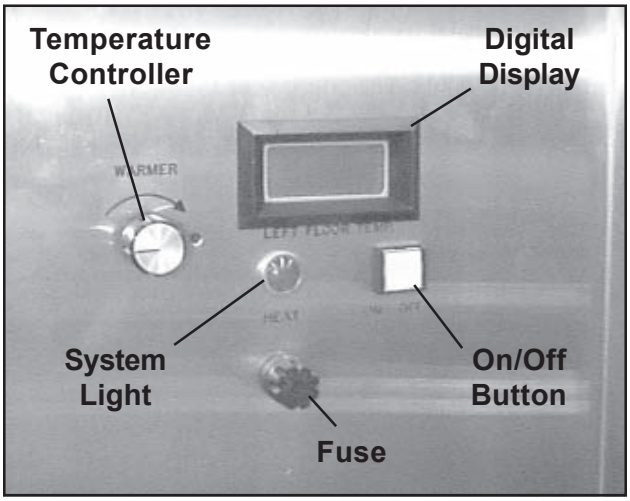

Figure 18. Floor Temperature Contols (Left Shown, Right Identical)

System Light

When this red light is On, it indicates that the system is operating. If the light is Off, it means that floor heat is not operating, even though it may be turned On. For example, the floor heat system might be On but not actually providing heat if the system senses that floor heat is currently at or above the temperature set on the control knob.

Temperature Controller

Turning the knob on the temperature controller raises or lowers the floor temperature in the animal compartment. Turn the knob clockwise to increase temperature, and counter-clockwise to decrease.

Digital Display

When the floor temperature system is On, this readout displays the current floor temperature in degrees-Fahrenheit.

Fuse

This is a 3AG fast-acting, 250 V, 2 amp fuse. If you need replacement fuses you can order them from SSCI, however, they are standard items, and will be faster and cheaper to obtain at your local hardware store. To replace or inspect a fuse, refer to *Replacing Floor Temperature Fuses* on *Page 61*.

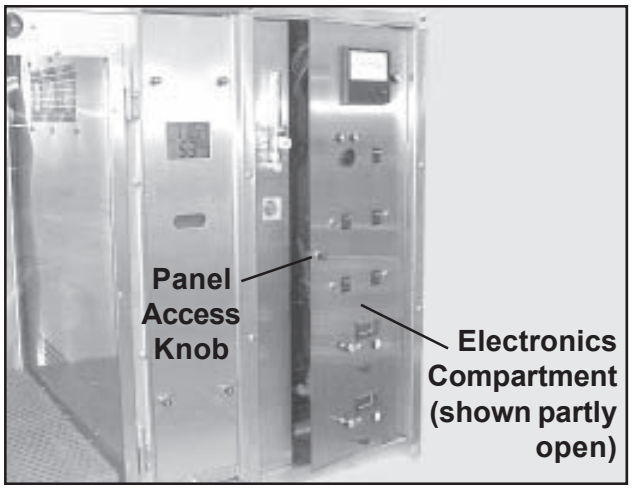

Figure 19. Panel Access Knob

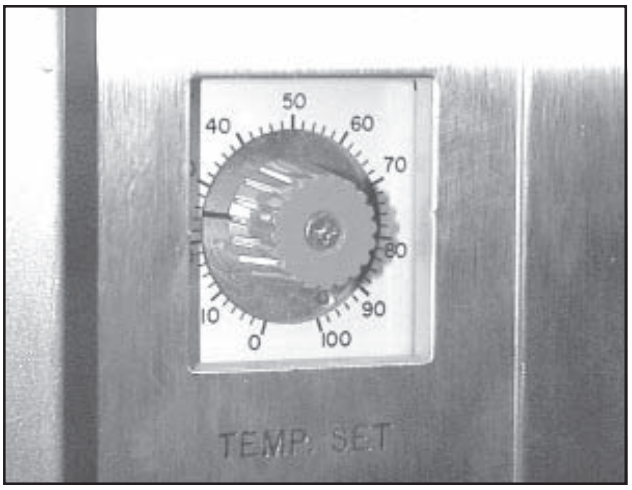

Figure 20. Temperature Set Dial

19 - Panel Access Knob

To access the interior of the electronics compartment, rotate the panel access knob (Figure 19) one-quarter turn counter-clockwise and swing the panel open to the right. For more information, refer to *Accessing the Electronics Compartment* on *Page 57*.

20 - Temperature Set Dial

The temperature set dial (Figure 20) controls a thermostat that sets the temperature for the re-circulating air in the animal compartment. It controls both heat and cooling and is calibrated in degrees-Fahrenheit. For more information, refer to *Heating the Compartment Air* on *Page 53* and *Cooling the Compartment Air* on *Page 54*.

21 - Audible Alarm

The alarm system (Figure 22) alerts you, with audible and visual signals, whenever there is a problem with the oxygen supply or concentration. The alarm system can be enabled or disabled. For more information, refer to *Using the Alarm System* on *Page 55*.

22 - Oxygen Flow Adjustment Knob

The oxygen flow adjustment knob (Figure 21) controls the flow rate of oxygen to the animal compartment. For more information, refer to *Using Oxygen* on *Page 51*.

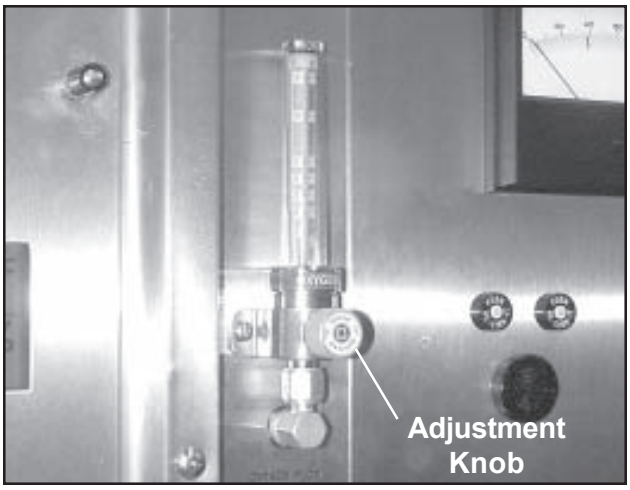

Figure 21. Oxygen Flow Meter and Adjustment Knob

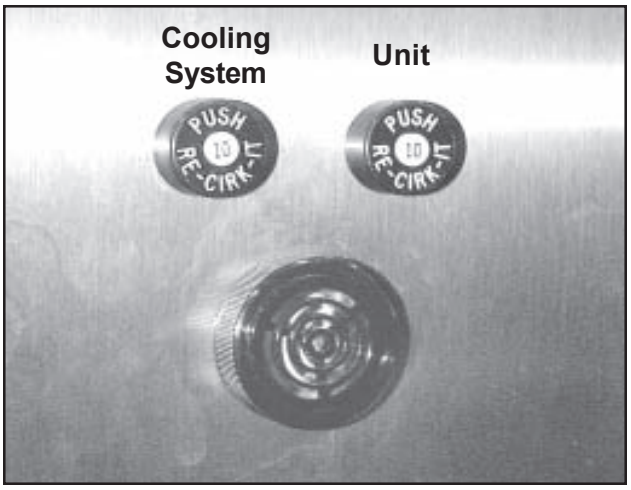

Figure 22. Circuit Breakers and Audible Alarm

23 - Oxygen Flow Meter and Solenoid Valve

The oxygen flow meter (Figures 11 and 21) displays the flow rate of oxygen into the animal compartment. The meter is calibrated from 1/2 to 15 lpm (liters-per-minute). Mounted behind the meter is a solenoid valve which turns the flow of oxygen on and off in response to commands from the system. For more information, refer to *Using Oxygen* on *Page 51*.

24 - Circuit Breakers

Two 10 amp. circuit breakers (Figures 11 and 22) are provided on the face of the electronics compartment. Circuit breakers are safety devices that shut down electrical power to the unit should an overload or short circuit occur. The left breaker (viewed from the front) protects the cooling system. The right breaker protects the remainder of the unit. For more information refer to *Re-Setting the Circuit Breakers* on *Page 60*.

Electronics Compartment, Internal

(Figure 23)

CAUTION: **Before working on the electrical system, make sure the unit is Off and the electric power cord un-plugged.**

The following section gives you detailed information on the components found on the inside of the electronics compartment.

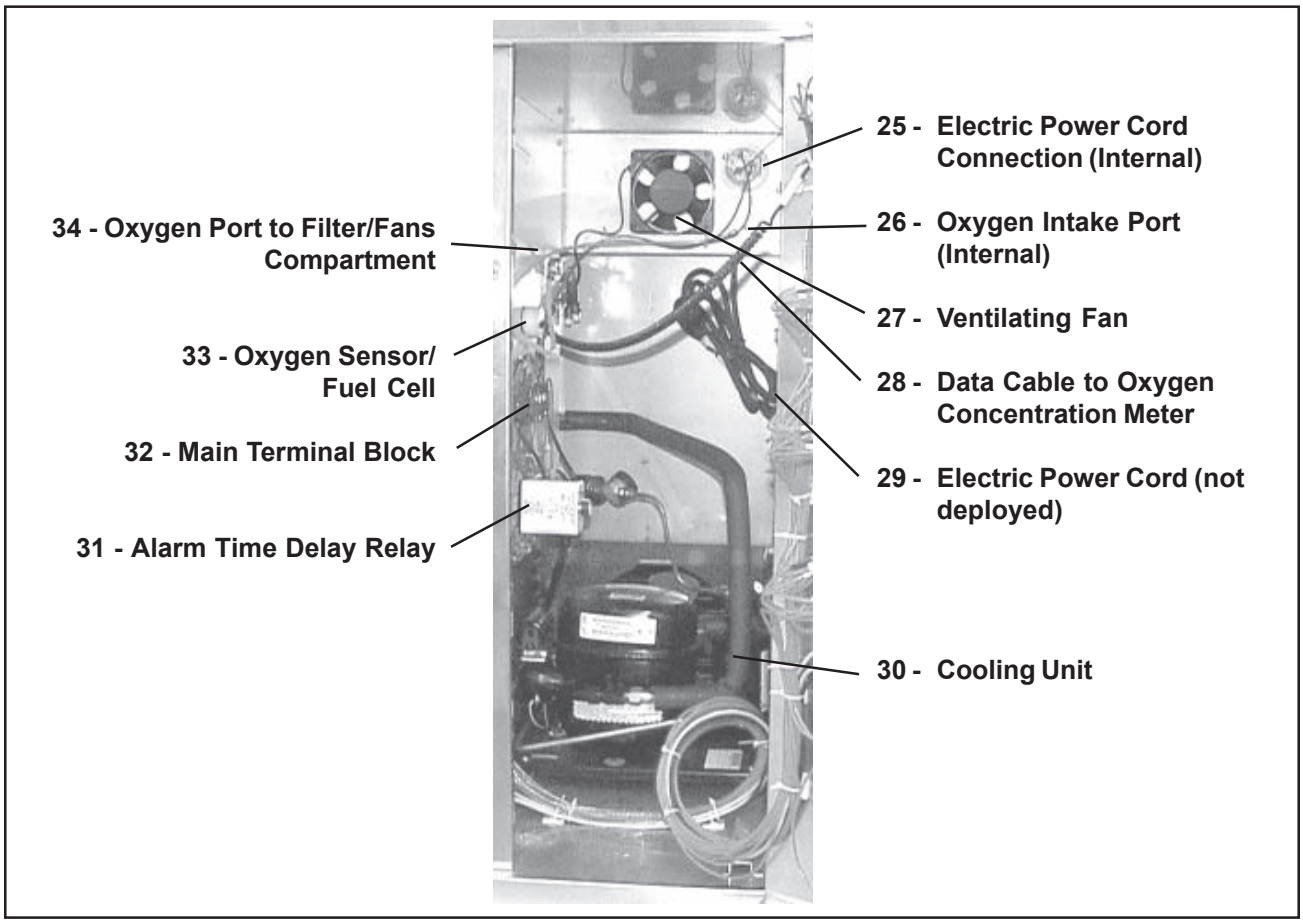

Figure 23. Electronics Compartment, Internal

25 - Electric Power Cord Connection

This is the inside of the electric power cord connection (Figures 23 and 24). From this connection, wires lead to the system ground, and to the main terminal block for distribution to the various electric/electronic components in the unit.

CAUTION: **The Regal Intensive Care Unit requires a dedicated, 15-amp minimum source of electrical power.**

26 - Oxygen Intake Port

From the pressure-regulated supply system, oxygen enters the Intensive Care Unit through this port (Figures 23 and 24). From here, it is directed to the oxygen flow meter for flow-rate regulation, then to the filter/fans compartment, and then into the animal compartment.

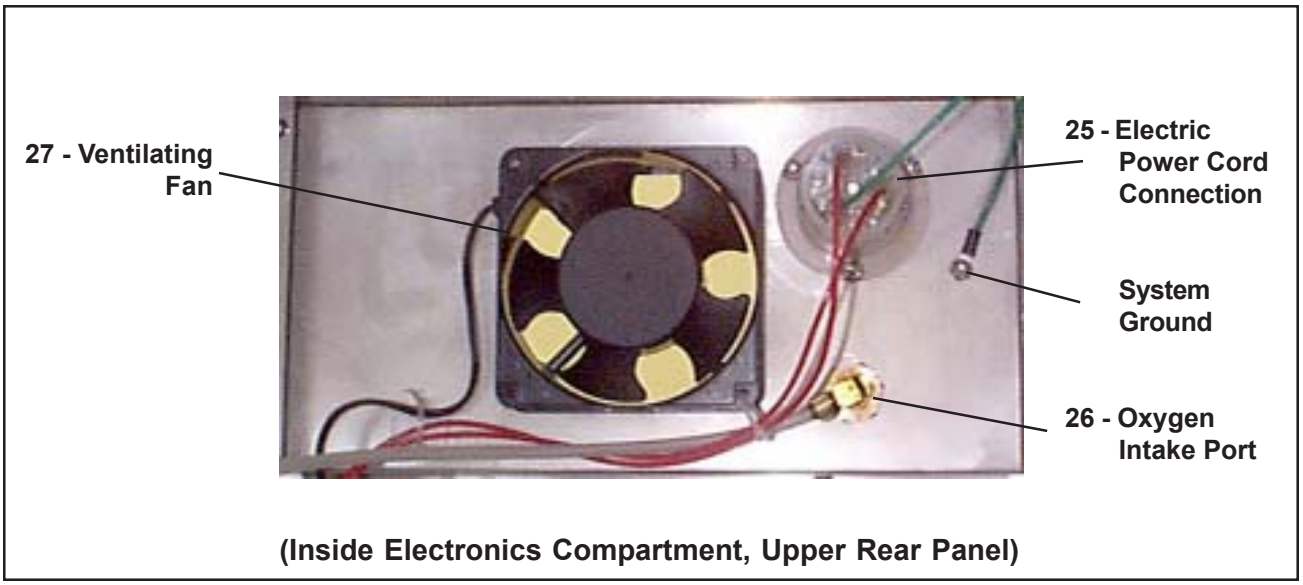

Figure 24. Electric Power Cord Connection, Oxygen Connection, and Ventilating Fan

27 - Ventilating Fan

A ventilating fan (Figures 23 and 24) provides a steady flow of air through the electronics compartment to prevent overheating of the internal components. The fan starts and stops automatically as the main on/off switch is turned On and Off.

28 - Data Cable to Oxygen Concentration Meter

This spiral cord (Figure 23) transmits electrical signals from the oxygen sensor/fuel cell to the oxygen concentration meter. These signals allow the meter to display the current oxygen concentration percentage to the user.

29 - Electric Power Cord

Figure 23 shows the electric power cord in its stored position, where it is carried during shipment of the Intensive Care Unit to the customer.

CAUTION: **The Regal Intensive Care Unit requires a dedicated, 15-amp minimum source of electrical power.**

30 - Cooling Unit

The cooling unit cools air to the animal compartment as required.

WARNING: **Do not attempt to work on or disassemble the cooling unit as it contains MP39 refrigerant gas under pressure. If service is required on the unit, call SSCI Customer Service at 1-800-323-7366, or a certified refrigeration serviceman.**

31 - Alarm Time Delay Relay

The time delay relay (Figures 23 and 25) determines how soon the alarm will go off after a malfunction of the oxygen system occurs. The relay controls the delay time from two to 300-seconds (five minutes). We recommend a time delay of about 30-seconds. This gives you adequate warning of problems in the oxygen system without alerting you to every minor, transient fault. To reset the time delay, refer to *Setting the Alarm Time Delay Relay* on *Page 59*.

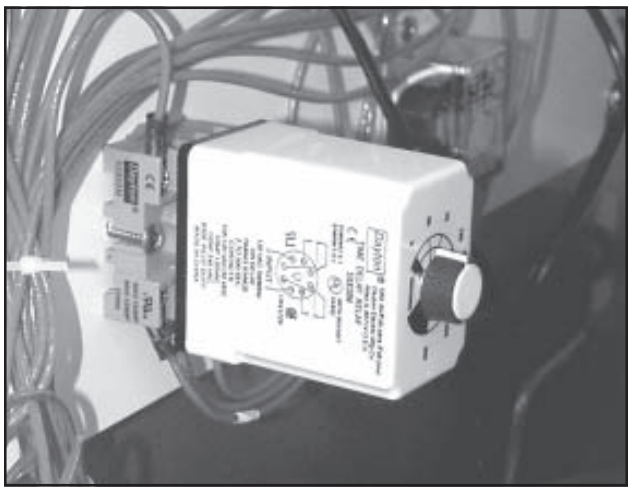

Figure 25. Alarm Time Delay Relay

32 - Main Terminal Block

The main terminal block (Figures 23 and 26) is the primary junction and distribution point for most of the electrical wiring in the Intensive Care Unit.

33 - Oxygen Sensor/ Fuel Cell

The oxygen sensor (Figures 23 and 26) is located in the partition wall between the electronics compartment and the filter/fans compartment. It senses the concentration of oxygen in the filter/fans compartment and sends this information to the oxygen concentration meter for display. Also, refer to Figure 29.

The fuel cell powers the black calibration needle in the oxygen concentration meter. The cell has an average life of about one year, depending on frequency of use. Difficulty in moving the black calibration needle is usually an indication of an exhausted fuel cell. Order replacements from SSCI, Part Number 853396. For information on replacing the fuel cell, refer to *Replacing the Fuel Cell* on *Page 68*.

CAUTION: **Before handling the fuel cell, please read *Fuel Cell Warnings* on *Page 4.***

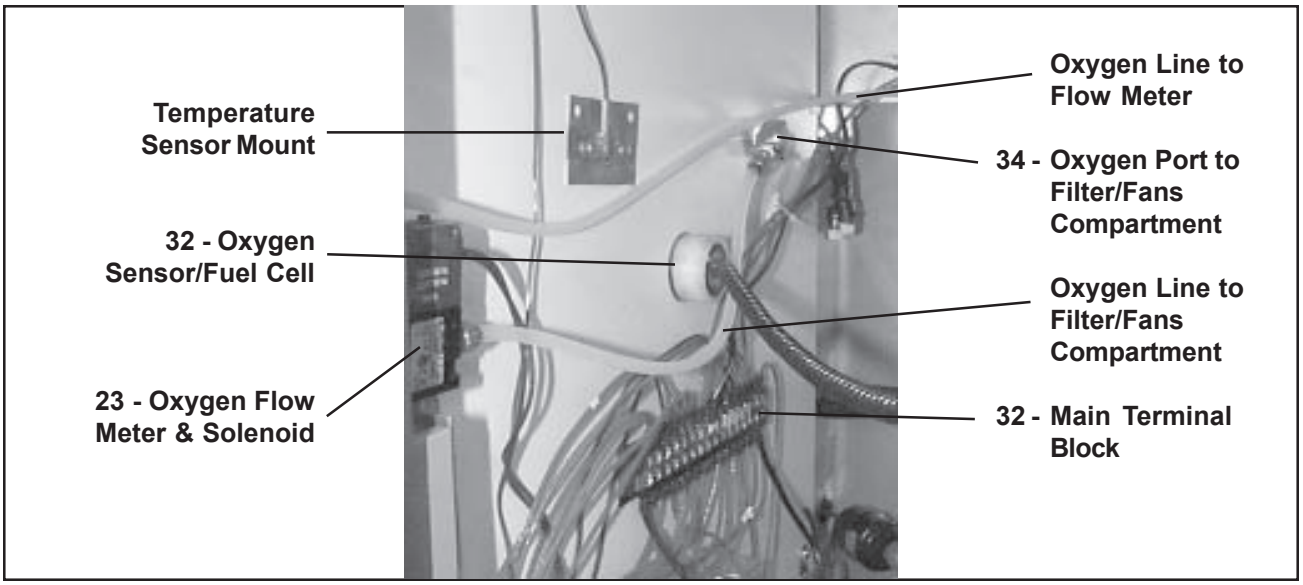

Figure 26. Main Terminal Block, Oxygen Sensor/Fuel Cell,and Oxygen Port to Filter/ Fans Compartment

34 - Oxygen Port to Filter/Fans Compartment

After leaving the oxygen flow meter, oxygen is directed through plastic tubing to this port in the partition wall between the electronics compartment and the filter/fans compartment (Figure 26). The oxygen is injected into the airflow after it passes through the Soda-lime filter, and is then carried to the animal compartment in the circulating air. Also, refer to Figure 29.

Filter/Fans Compartment, External

(Figure 27)

The following section gives you detailed information on the components found on the outside of the filter/fans compartment.

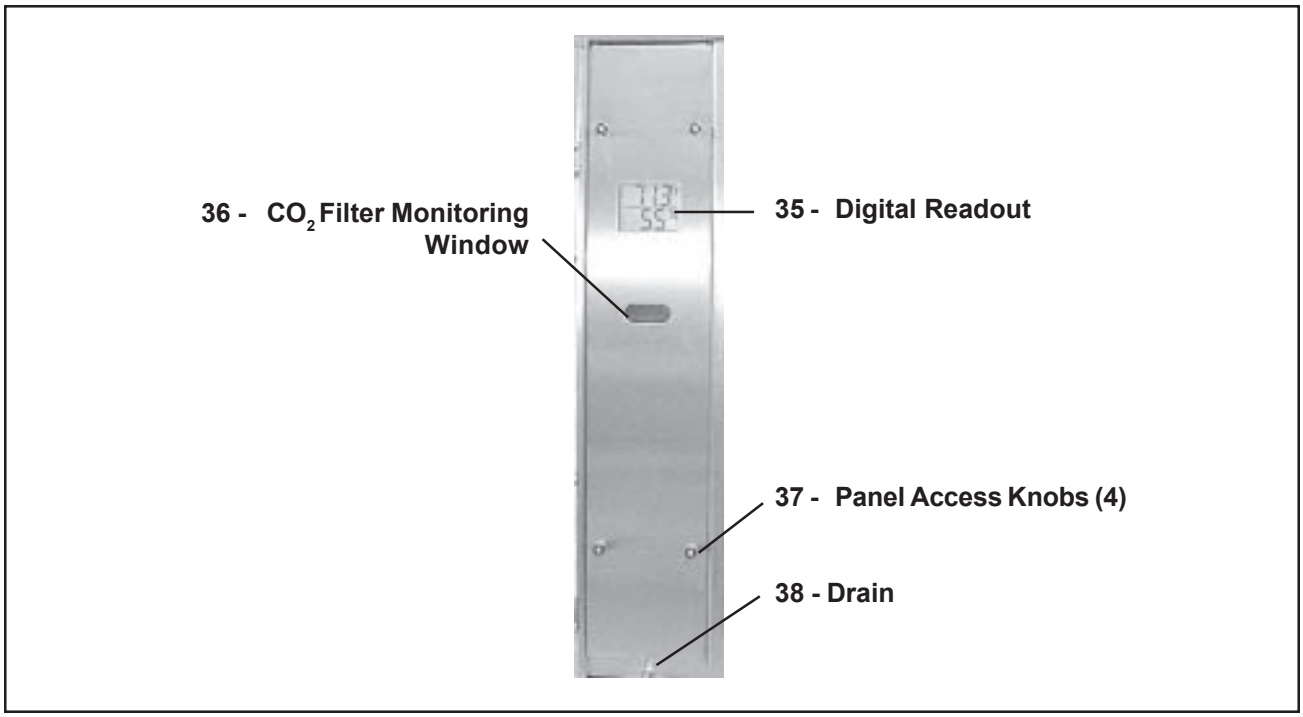

Figure 27. Filter/Fans Compartment, External

35 - Digital Readout

This two-function digital readout (Figures 27 and 28) displays the temperature and humidity in the animal compartment. At the top of the readout, temperature is displayed in degrees-Fahrenheit (or Centigrade). The bottom of the readout displays percent humidity. The readout operates independently of the other components in the ICU and is powered by its own Type AAA battery. To replace this battery, refer to *Replacing the Digital Readout Battery* on *Page 62*.

36 - CO_2 Filter Monitoring Window

The CO_2 filter monitoring window (Figure 28) allows you to view the Sodalime carbon-dioxide filter to determine its current condition. When fresh, the Sodalime is off-white in color. As it absorbs CO_2, it slowly darkens and ultimately becomes a deep brown. When it is fully saturated it must be replaced as it is no longer effective. A single pan of absorbent will normally last for about one month, however, usage factors and environmental conditions can have a substantial impact. For information on how to re-fill the Sodalime pan, refer to *Re-filling the CO_2 Filter* on *Page 65*.

***CAUTION:* Before handling Sodalime, please read *Sodalime Warnings* on *Page 4*.**

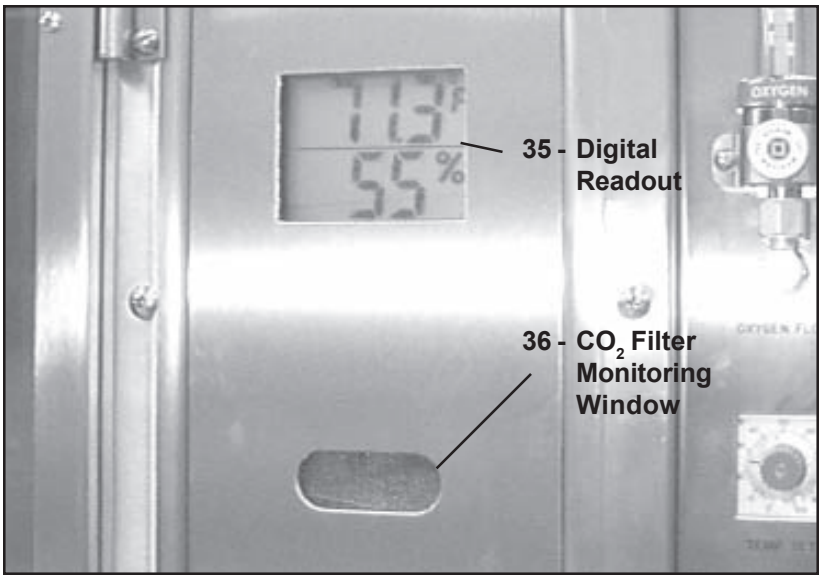

Figure 28. Digital Readout and CO_2 Filter Monitoring Window

37 - Panel Access Knobs

Rotate the four panel access knobs one-quarter turn counter-clockwise (Figure 27) to gain access to the interior of the filter/fans compartment. For further information, refer to *Accessing the Filter/Fans Compartment* on *Page 58.*

CAUTION: **When using oxygen, all four access knobs on the filter/fans compartment must be firmly locked to prevent oxygen leakage from the animal compartment.**

38 - Drain

When cooled air is supplied to the animal compartment(s), the possibility exists that water will condense on the chiller, and fall to the compartment floor. This is especially true in very humid climates. This drain is provided to prevent the accumulation of water on the floor of the filter/fans compartment.

Filter/Fans Compartment, Internal

(Figure 29)

The following section gives you detailed information on the components found on the inside of the filter/fans compartment.

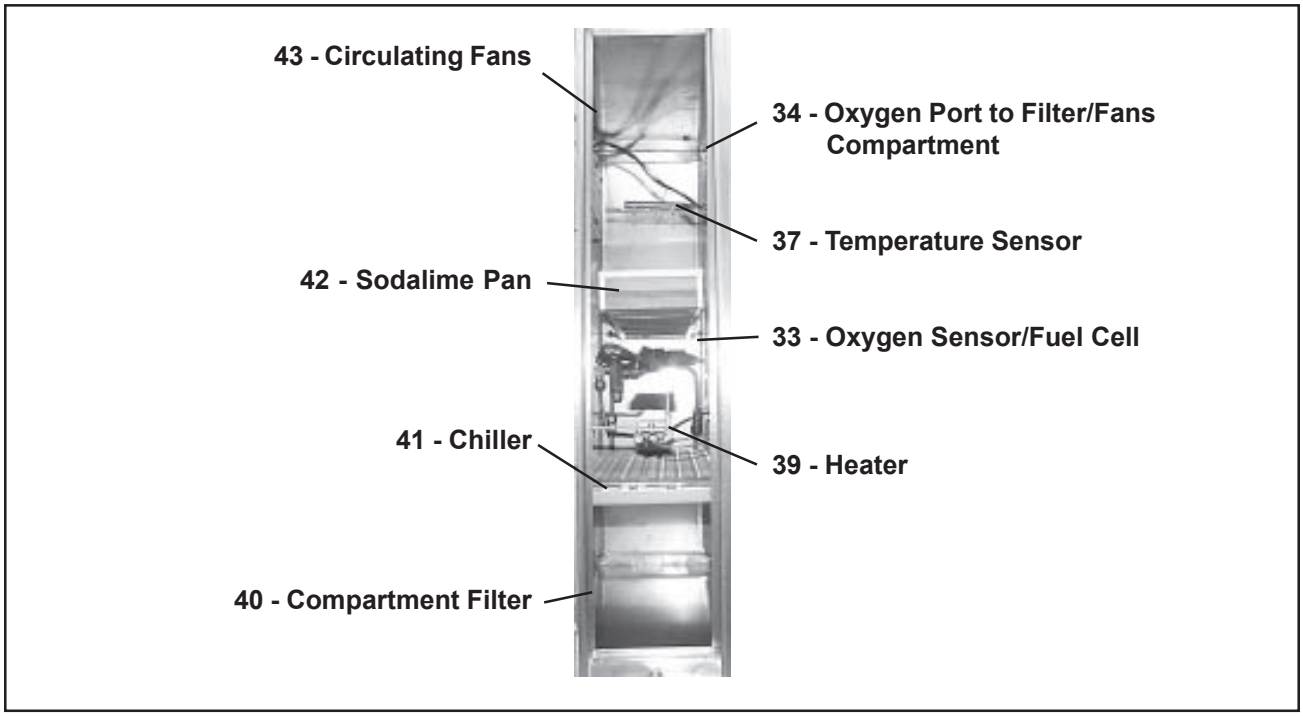

Figure 29. Filter/Fans Compartment, Internal

33 - Oxygen Sensor/ Fuel Cell

The oxygen sensor (Figures 23, 26, and 29) is located in the partition wall between the electronics compartment and the filter/fans compartment. It senses the concentration of oxygen in the filter/fans compartment and sends this information to the oxygen concentration meter for display.

The fuel cell powers the black calibration needle in the oxygen concentration meter. The cell has an average life of about one year, depending on frequency of use. Difficulty in moving the black calibration needle is usually an indication of an exhausted fuel cell. Order replacements from SSCI, Part Number 853396. For information on replacing the fuel cell, refer to *Replacing the Fuel Cell* on *Page 68*.

CAUTION: **Before handling the fuel cell, please read Fuel Cell Warnings on *Page 4.***

34 - Oxygen Port to Filter/Fans Compartment

After leaving the oxygen flow meter, oxygen is directed through plastic tubing to this port in the partition wall between the electronics compartment and the filter/fans compartment (Figures 23, 29, and 30). The oxygen is released into the airflow after the air passes through the Sodalime filter, and is then carried to the animal compartment in the circulating air. Also, refer to Figure 23.

37 - Temperature Sensor

The temperature sensor (Figures 29 and 30) senses the temperature of the circulating air after it passes through the chiller and heater. This data is compared to the temperature called for on the temperature set dial and the result causes the heating or cooling systems to turn on or off as needed.

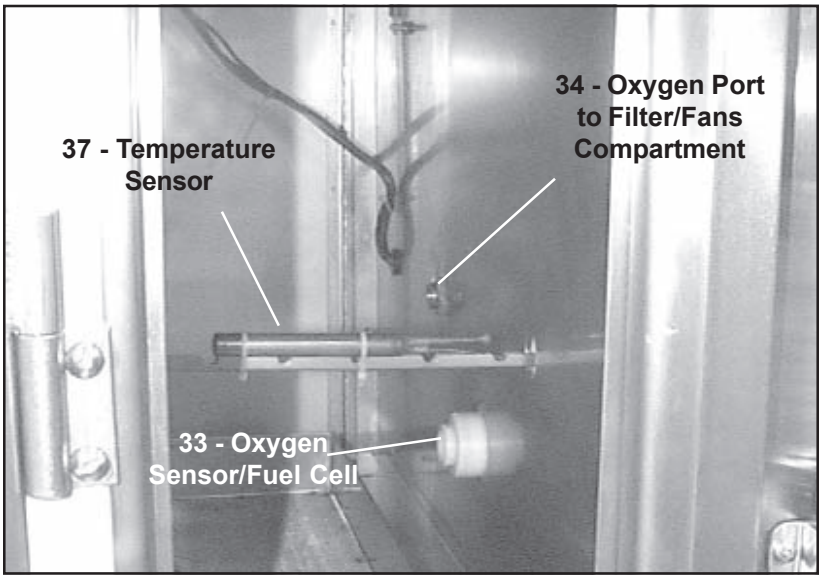

Figure 30. Oxygen Sensor/Fuel Cell, Oxygen Port to Filter/Fans Compartment, and Temperatue Sensor

39 - Heater

The heater (Figures 29 and 31) applies heat to the circulating air as it passes through the filter/fans compartment. It acts in response to the setting on the temperature set dial as compared to the level of heat in the animal compartment detected by the temperature sensor.

40 - Compartment Filter

A metal mesh filter in the filter/fans compartment (Figure 29 and 32) cleans air returning to the compartment from the animal compartment. Its purpose is to remove animal hair and other contaminants from the circulating air before it passes through the Sodalime filter. For instructions on cleaning the filter, refer to *Cleaning the Filter/ Fans Compartment Filter* on *Page 67*.

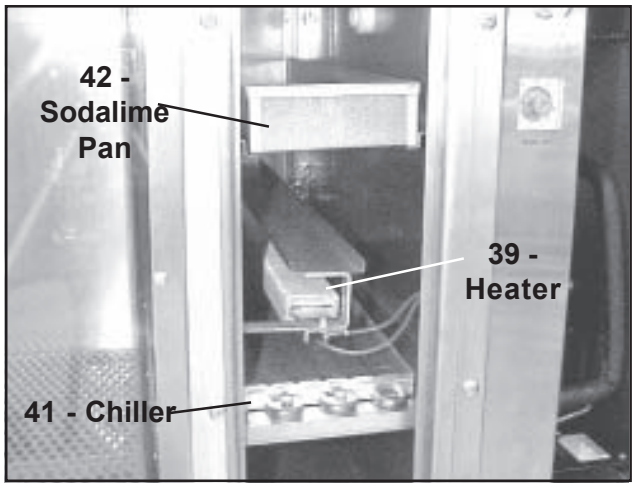

Figure 31. Heater, Chiller, and Sodalime Pan

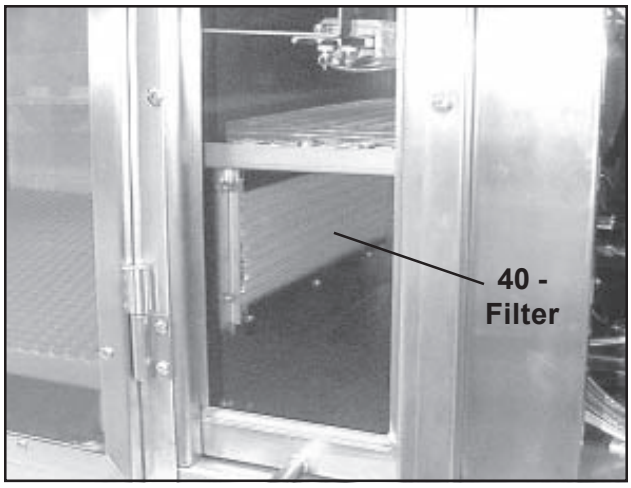

Figure 32. Compartment Filter

41 - Chiller

The chiller (Figures 29 and 31) cools the circulating air as it passes through the filter/fans compartment. It acts in response to the setting on the temperature set dial as compared to the level of heat in the animal compartment.

42 - Sodalime Pan

A quantity of Sodalime is carried in a pan inside the filter/fans compartment (Figures 29 and 31). Circulating air leaving the animal compartment is directed through this substance which removes the carbon-dioxide.

The CO_2 filter monitoring window (Figures 27 and 28) allows you to view the Sodalime carbon-dioxide filter to determine its current condition. When fresh, the Sodalime is off-white in color. As it absorbs CO_2, it slowly darkens and ultimately becomes a deep brown. When it is fully saturated it must be replaced as it is no longer effective. To replace the Sodalime, refer to *Re-filling the CO_2 Filter* on *Page 65*.

A single pan of absorbent will normally last for about one month, however, usage factors and environmental conditions can have a substantial impact. A supply of fresh Sodalime is provided with each new Intensive Care Unit. For a new supply, call SSCI and order P/N 853439.

CAUTION: **Before handling Sodalime, please read Sodalime Warnings on *Page 4.***

43 - Circulating Fans

Three circulating fans (Figures 29 and 33) move air at approximately 50 CFM (cubic feet per minute) and are designed to handle the enriched oxygen environment in which they operate. The system achieves a complete air change in the full-size animal compartment every 30-seconds, and 15-seconds in the half-size compartment when the clear acrylic divider is in place. The fans start and stop automatically as the main on/off switch is turned to On and Off.

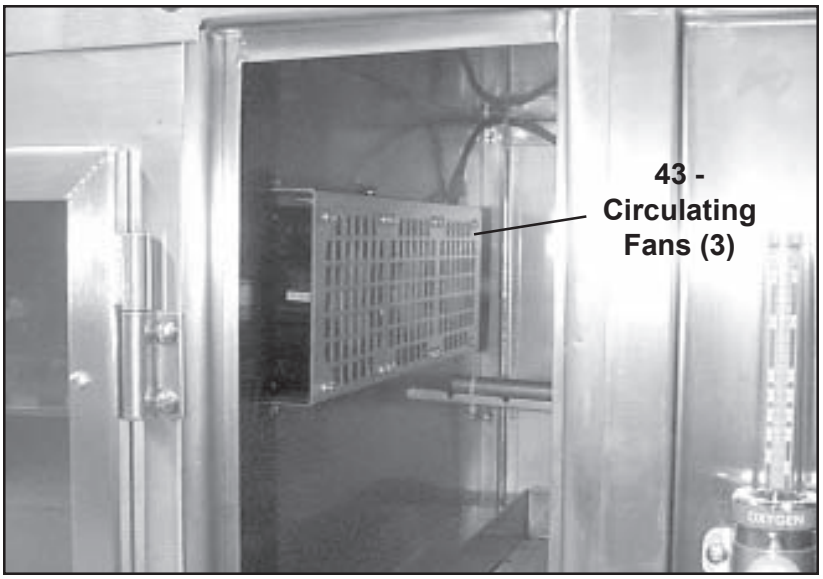

Figure 33. Circulating Fans

Intensive Care Unit, Rear

(Figure 34)

The following section gives you detailed information on the components on the rear of the Intensive Care Unit.

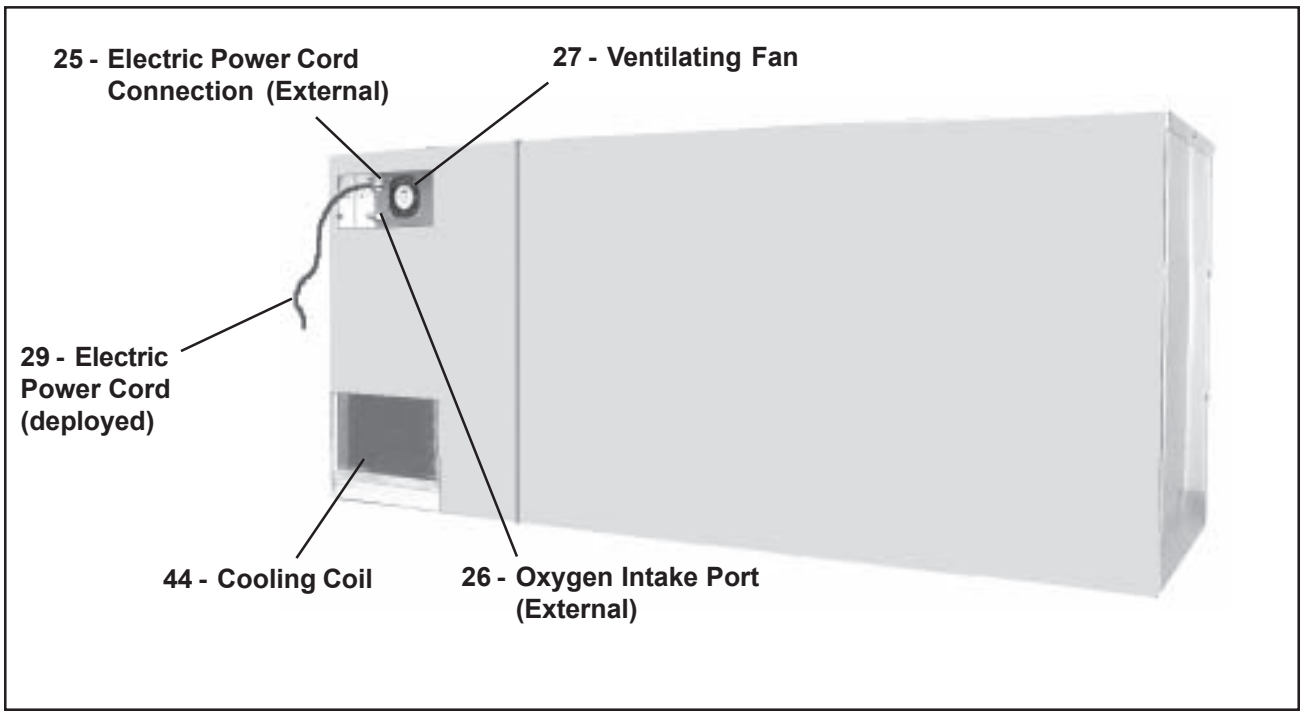

Figure 34. Intensive Care Unit, Rear

29 - Electric Power Cord

This figure shows the electric power cord in its deployed position ready to be plugged into its outlet. Also, refer to *Electric Power Cord* on *Page 21*.

CAUTION: **The Regal Intensive Care Unit requires a dedicated, 15-amp minimum source of electrical power.**

25 - Electric Power Cord Connection

This is the external portion of the electric power cord connection. Inside the unit, wires from this connection lead to the system ground, and to the main terminal block for distribution to the various electric/electronic components in the unit. Also, refer to *Electric Power Cord Connection* on *Page 20*.

26 - Oxygen Intake Port

From the pressure-regulated supply system, oxygen enters the Intensive Care Unit through this port. From here, it is directed to the oxygen flow meter for flow-rate regulation, then to the filter/fans compartment, and then into the animal compartment.

27 - Ventilating Fan

A ventilating fan provides a steady flow of air through the electronics compartment to prevent overheating of the internal components. The fan starts and stops automatically as the main on/off switch is turned On and Off. **Note:** There must be a minimum of six-inches clearance between the rear of the unit and any wall or other surface to allow sufficient airflow to the fan.

44 - Cooling Coil

This is the cooling coil for the cooling unit. Also, refer to *Cooling Unit* on *Page 21* and *Cleaning the Cooling Coil* on *Page 67*. **Note:** There must be a minimum of six-inches clearance between the rear of the unit and any wall or other surface to allow sufficient airflow to the cooling coil.

Notes:

Chapter 3 - Installation & Setup

WARNING: **Oxygen is a highly combustible gas. Avoid the use of open flames, smoking materials, or equipment capable of producing sparks in any area in which oxygen is being used. Before servicing or performing maintenance on this equipment, make sure the oxygen supply is turned off at the source.**

CAUTION: **The Regal Intensive Care Unit requires a dedicated, 15-amp minimum source of electrical power.**

Unpacking and Inspection

CAUTION: **Unpacking, installing and setting up the Regal Intensive Care Unit is not difficult. The unit is heavy, however, and we recommend that these operations be done by at least two people.**

If the shipping container appears damaged in any way, contact the shipping company immediately. Save all damaged packing materials to assist in proving liability for damage.

Carefully inspect your Regal Intensive Care Unit while you unpack it. If damage is noted, or if parts appear to be missing, call the SSCI Customer Service Department at 1-800-323-7366. For a list of parts supplied with the unit, refer to *Parts Included* below.

Parts Included

The following parts are included in the shipment:

- Regal Intensive Care Unit
- Orange Removable PVC Floor (2)
- Wire Grill Divider Panel
- Clear Acrylic Divider Panel
- Teledyne Oxygen Sensor (Fuel Cell)
- Sodalime, 2.5 lb. Container (3)

Installation and Setup

Overview

Installing and setting up the Regal Intensive Care Unit is a twelve step process:

Installation Requirements

Electrical Requirements

The Regal Intensive Care Unit requires a dedicated, minimum 15-amp, 120 VAC, 60 Hz. source of electrical power.

Oxygen Requirements

The Regal Intensive Care Unit requires a regulated source of oxygen. SSCI recommends an intake pressure of 10 to 20 psi with a flow rate of 15 lpm. Your experience may indicate that a greater or lesser pressure and/or flow rate are desirable.

Assembling and Placing the Base

If the Intensive Care Unit is to be mounted on an SSCI mobile or cabinetry base, unpack and assemble the base first. Refer to the assembly instructions packed with the base. If an SSCI base is not going to be used, fully prepare the area where the Intensive Care Unit will go so that it is ready to receive the unit.

Mounting the Intensive Care Unit

After the Regal Intensive Care Unit is fully unpacked and all parts accounted for, place the unit on the base or in its intended location.

CAUTION: **Leave a minimum of six-inches clearance between the rear of the unit and any wall or other surface to allow sufficient airflow to the fan and cooling coils, and for access to the electrical and oxygen connections.**

Figure 35. Fuel Cell Box and Bagged Fuel Cell

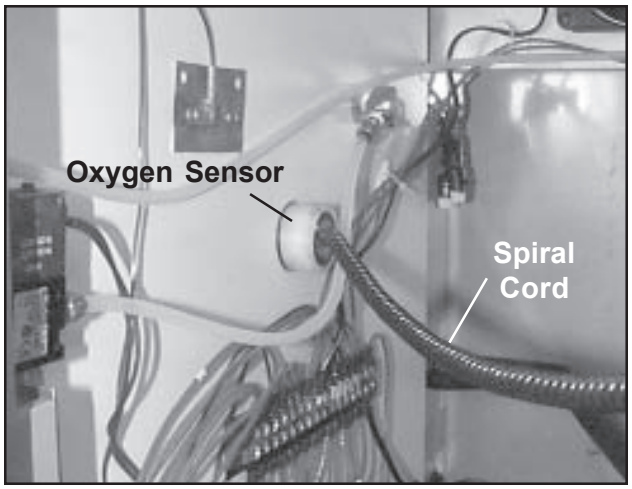

Figure 36. Oxygen Sensor Inside the Electronics Compartment

Installing the Fuel Cell

A fuel cell in the oxygen sensor powers the black calibration needle in the oxygen concentration meter. The fuel cell comes packed in a brown, cardboard box marked "Teledyne Oxygen Sensor" (Figure 35).

CAUTION: **Do not remove the fuel cell from the bag until ready to use.**

CAUTION: **Wear safety glasses when handling the fuel cell.**

CAUTION: **Avoid contact with the sensing surface.**

CAUTION: **The fuel cell contains lead, a chemical known to cause cancer, birth defects, or other reproductive harm.**

CAUTION: **Wash your hands thoroughly after handling the fuel cell.**

1. Open the brown box, then open the plastic bag inside and take out the fuel cell (Figure 35).

2. Open the electronics compartment (refer to *Page 57*).

3. Open the filter/fans compartment (refer to *Page 58*).

4. Inside the filter/fans compartment, notice the installation of the oxygen sensor (Figure 37).

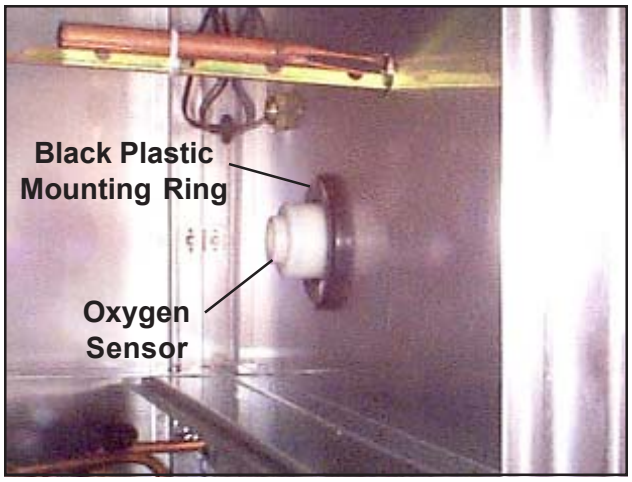

Figure 37. New Style Oxygen Sensor Mount

- If the oxygen sensor is mounted in the large black plastic ring, you have a New Style Intensive Care Unit (produced after January 1, 2005). Proceed to ***New Style Units*** on *Page 37*.
- If this large black ring is not present, you have an Original Style Intensive Care Unit (produced before January 1, 2005). Follow the instructions under ***Original Style Units*** below.

Original Style Units:

1. In the electronics compartment (Figure 36) twist the sensor slightly, and pull it out of the compartment wall. **Note:** Do not try to detach the spiral cord from the sensor.

2. Unscrew the end cap from the oxygen sensor (Figure 38).

3. On the fuel cell, remove the shorting button - refer to the instructions packed with the fuel cell.

Note: Watch the oxygen concentration meter (Figure 39) as you perform *Step 4*. The black calibration needle moves to the right, then settles down.

4. Place the fuel cell into the oxygen sensor body. The end of the fuel cell with the metal disk goes in first.

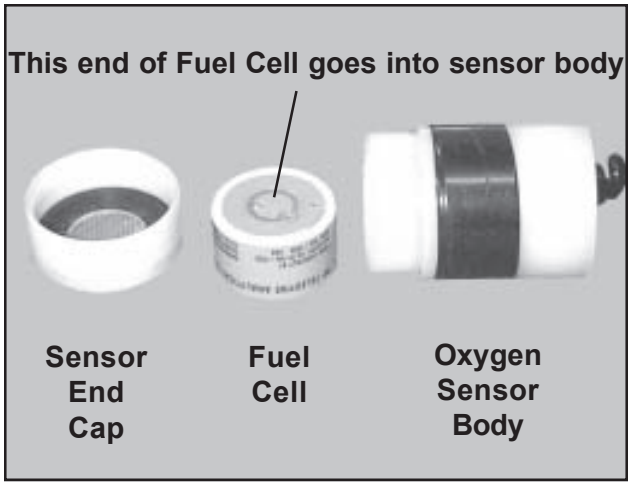

Figure 38. Fuel Cell and Oxygen Sensor Assembly

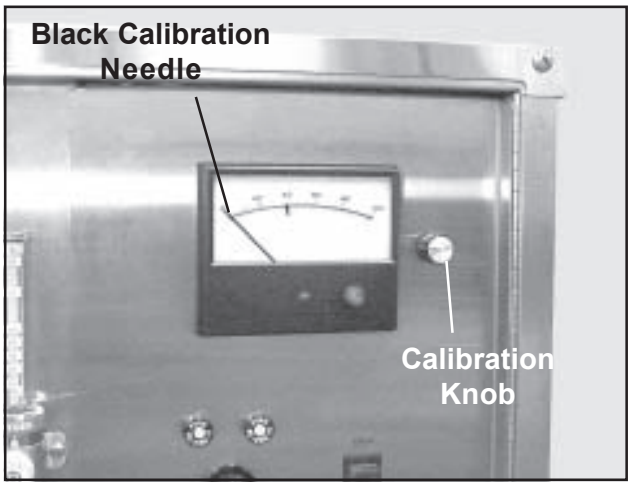

Figure 39. Oxygen Concentration Meter and Calibration Knob

5. Gently, screw the sensor end cap (Figure 38) back on. Be careful, the threads are very fine and are easily damaged.

6. Re-insert the oxygen sensor/fuel cell into the wall (Figure 36).

7. Proceed to *Finish the Installation* below.

New Style Units

1. Do not remove the oxygen sensor from the partition wall.

2. With the oxygen sensor in place in the partition wall, unscrew the end cap from the oxygen sensor (Figure 38).

3. On the fuel cell, remove the shorting button - refer to the instructions packed with the fuel cell.

Note: Watch the oxygen concentration meter (Figure 39) as you perform *Step 4*. The black calibration needle moves to the right, then settles down.

4. Place the fuel cell into the oxygen sensor body. The end of the fuel cell with the metal disk goes in first.

5. Gently, screw the sensor end cap (Figure 38) back on. Be careful, the threads are very fine and are easily damaged.

6. Proceed to *Finish the Installation* below.

Finish the Installation

1. Close and secure the electronics compartment door.

2. Close and secure the filter/fans compartment.

3. Using the calibration knob (Figure 39), position the black needle in the oxygen concentration meter to 20.5% (the percentage of oxygen in atmospheric air).

4. When you are finished working with the fuel cell, wash your hands thoroughly.

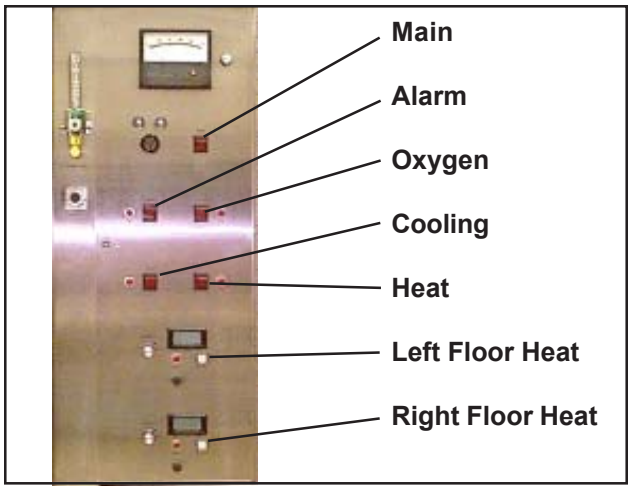

Figure 40. On/Off Switches/Buttons on Electronics Compartment Door

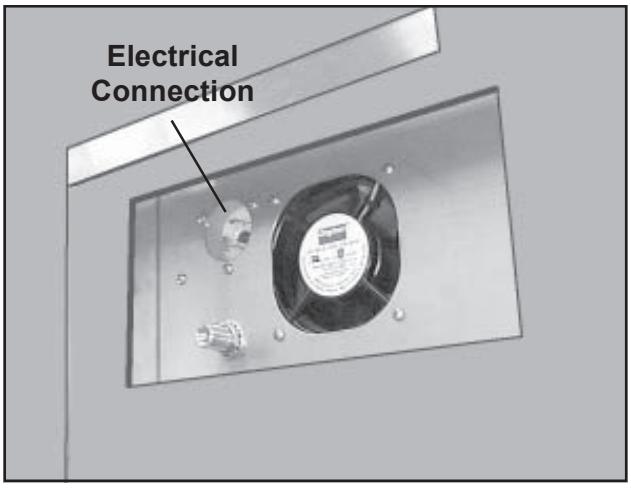

Figure 41. Electrical Connection at Rear of Unit

Connecting Electrical Power

CAUTION: **The Regal Intensive Care Unit requires a dedicated, 15-amp minimum source of electrical power.**

1. Make sure that all seven on/off switches and buttons (Figure 40) are in the Off position (The upper ends of all switches should be depressed):
   - Main On/Off Switch
   - Alarm On/Off Switch
   - Oxygen On/Off Switch
   - Cooling On/Off Switch
   - Heat On/Off Switch
   - Left Floor Heat On/Off Button
   - Right Floor Heat On/Off Button

2. Open the electronics compartment (refer to *Page 57*) and remove the electrical power cord (Figure 23 on *Page 20*).

3. Plug the power cord into its wall outlet.

4. Plug the large end of the power cord into the power connection at the rear of the unit (Figure 41) and twist clockwise to lock.

5. Push the main on/off switch to On. The amber light in the switch comes on. The three circulating fans in the filter/fans compartment and the ventilating fan in the electronics compartment start running.

6. Push the main on/off switch to Off. The light in the switch goes out and all the fans stop.

Checking the Heating Function

Note: To speed up these tests, install the clear, acrylic divider (*Page 49*). It take less time to heat or cool the half-compartment than the full compartment.

1. Push the main on/off switch (Figure 40) to On. The amber light in the switch comes on.

2. Make sure that both animal compartment doors are closed and latched.

3. Push the heat on/off switch (Figure 40) to On. The amber light in the switch comes on.

4. Turn the temperature set dial clockwise until the red system light comes on. Heat comes on in the animal compartment.

5. Observe the digital readout (*Page 24*) on the filter/fans compartment front panel. The temperature slowly climbs until it reaches the level set on the temperature set dial at which time, the system light goes out.

6. Push the heat on/off switch to Off. The light in the switch goes out.

7. Push the main on/off switch (Figure 40) to Off. The light in the switch goes out.

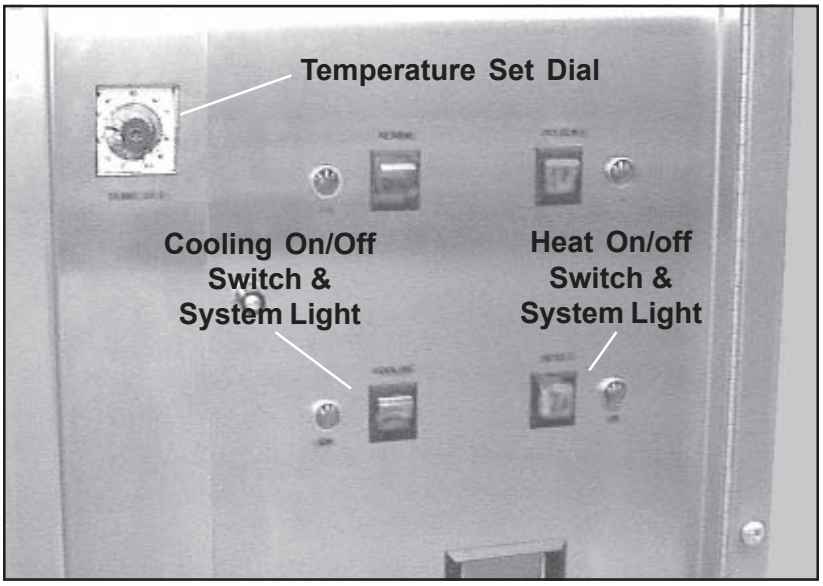

Figure 42. Heat and Cooling Controls

Checking the Cooling Function

1. Push the main on/off switch (Figure 40) to On. The amber light in the switch comes on.

2. Push the cooling on/off switch (Figure 42) to On. The amber light in the switch comes on.

3. Turn the temperature set dial to about 5° below ambient room temperature. Because the animal compartment is still warm and cooling is now called for, the cooling system activates and the red system light comes on.

4. Observe the digital readout (*Page 24*) on the filter/fans compartment front panel. The temperature slowly drops until it reaches the level set on the temperature set dial, at which time, the system light goes out.

5. Push the cooling on/off switch to Off. The light in the switch goes out.

6. Push the main on/off switch to Off. The light in the switch goes out.

Checking Floor Heat (Left)

1. Push the main on/off switch (Figure 40) to On. The amber light in the switch comes on.
2. Push the left floor heat on/off button (Figures 40 and 43) to On. The amber light in the button comes on.
3. Turn the temperature control knob (Figure 43) clockwise until the red system light comes on. Heat to the left half-size compartment floor comes on.
4. Watch the digital display (Figure 43). It should show a temperature increase.
5. Wait until the system light goes out.
6. Push the left floor heat on/off button to Off. The light in the button goes out.
7. Push the main on/off switch to Off. The light in the switch goes out.

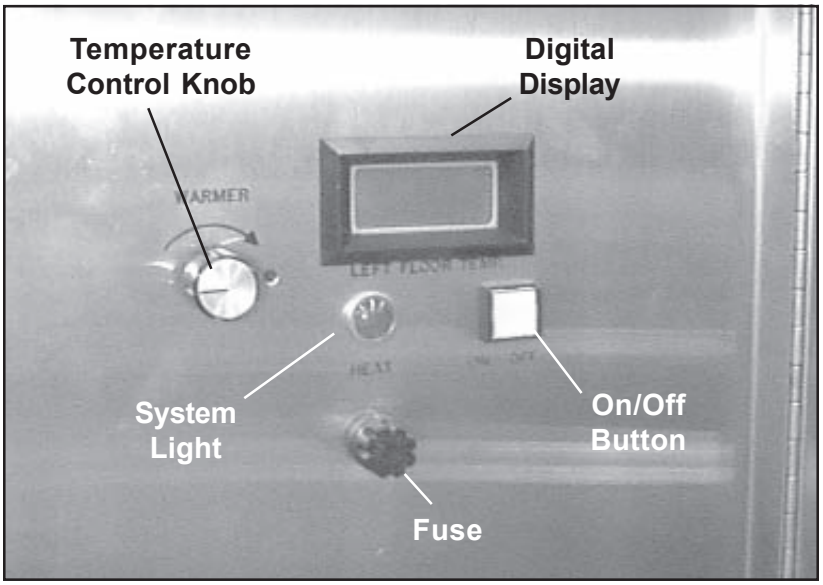

Figure 43. Floor Temperature Controls (Left Shown, Controls for Right Side are Identical)

Checking Floor Heat (Right)

Repeat *Steps 1* though *7* above for the right floor temperature controls.

Checking the Oxygen System

Note: You can perform this test even though oxygen has not yet been hooked up.

1. Push the main on/off switch (Figure 40) to On. The amber light in the switch comes on.

2. Push the oxygen on/off switch to On (Figure 44). The amber light in the switch comes on. If the black calibration needle in the oxygen concentration meter (Figure 45) is to the left of the red set-point needle, the red system light will also come on.

3. If the black needle is to the right of the red needle, use the set-point adjustment knob to place the red needle to the right of the black needle. The red system light comes on.

4. Push the main on/off switch to Off. The light in the switch goes out.

5. Return the black calibration needle to the 20.5% setting.

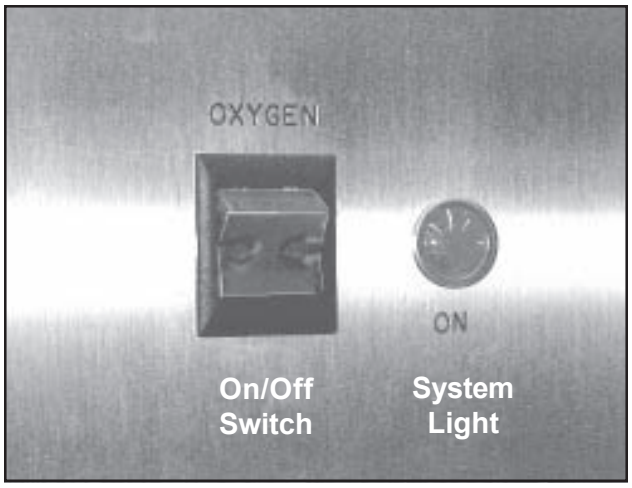

Figure 44. Oxygen On/Off Switch and System Light

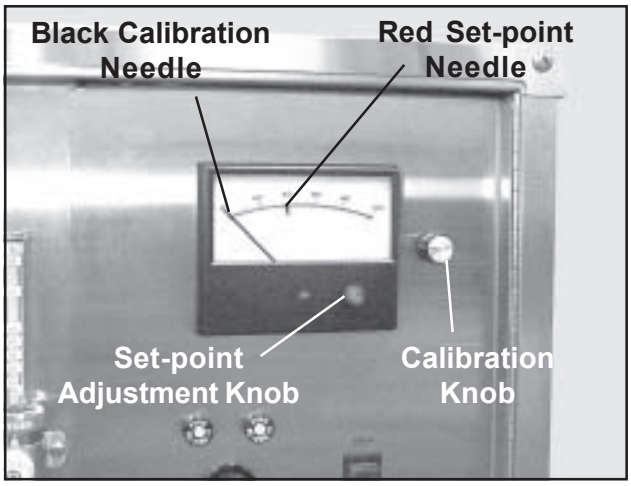

Figure 45. Oxygen Concentration Meter and Controls

Checking the Alarm Function

The alarm system on the Regal Intensive Care Unit warns you if there is a problem with the oxygen supply or concentration.

1. Open the electronics compartment (refer to *Page 57*).
2. Set the alarm time delay relay to 30-seconds (Figure 46).
3. With the calibration knob (Figure 45), adjust the black calibration needle in the oxygen concentration meter to 20.5% (the percentage of oxygen in atmospheric air).
4. With the set-point adjustment knob, position the red set-point needle to about 30%.
5. Push the main on/off switch (Figure 40) to On. The amber light in the switch comes on.
6. Push the oxygen on/off switch (Figure 44) to On. The amber light in the switch comes on.
7. Push the alarm on/off switch (Figure 47) to On. The amber light in the switch comes on.

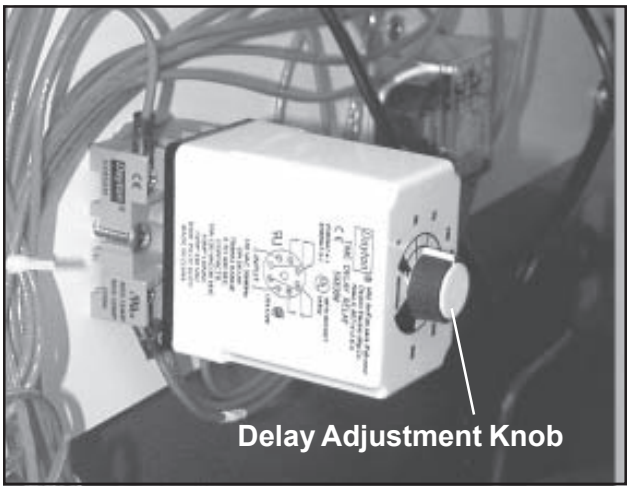

Figure 46. Alarm Time Delay Relay

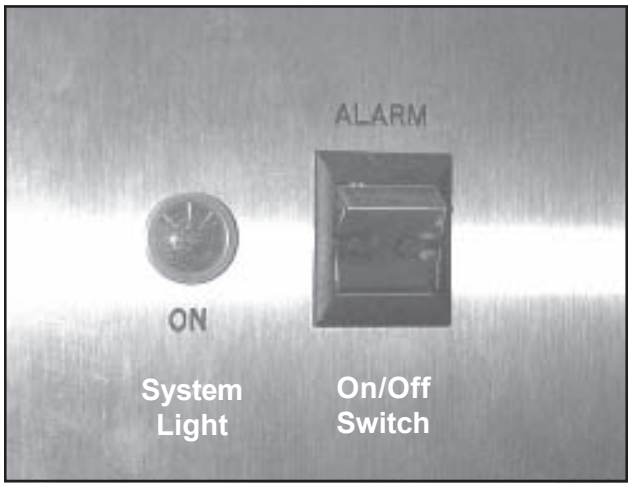

Figure 47. Alarm Controls

8. After 30-seconds, since oxygen is not hooked-up, the system senses that the oxygen concentration is inadequate. The audible alarm sounds and the red system light goes on.
9. Move the red set-point needle to 10%. As the red needle passes the black needle, the audible alarm stops. Both the alarm and oxygen system lights go out.

10. Push the alarm on/off switch to Off. The light in the switch goes out.

11. Push the oxygen on/off switch to Off. The light in the switch goes out.

12. Push the main on/off switch to Off. The light in the switch goes out.

13. Return the red set-point needle to the right of the black needle.

Connecting the Oxygen Supply

SSCI recommends an intake pressure of 10 to 20 psi with a flow rate of 15 lpm. Your experience may indicate that a greater or lesser pressure and/or flow rate are desirable.

WARNING: **Oxygen is a highly combustible gas. Avoid the use of open flames, smoking materials or equipment capable of producing sparks in any area in which oxygen is being used.**

WARNING: **Oxygen-in-use warning signs should be prominently displayed where the Intensive Care Unit is used, and outside of all entrance doors to the room.**

Note: Your oxygen supplier is the best source to make the oxygen hook-up for you.

1. Make sure the main on/off switch (Figure 40) is Off.

2. Using the calibration knob (Figure 45), adjust the black calibration needle in the oxygen concentration meter to 20.5% (the percentage of oxygen in atmospheric air).

3. Using the set-point adjustment knob, set the red set-point needle to about 25%.

Note: The oxygen connection has both internal and external threads. Connection can be made with either:

- 1/4-in. male NPT
- 1/2-in. female NPT

4. Hook up the oxygen supply to the oxygen port at the rear of the unit (Figure 48).

5. Push the main on/off switch to On. The amber light in the switch comes on.

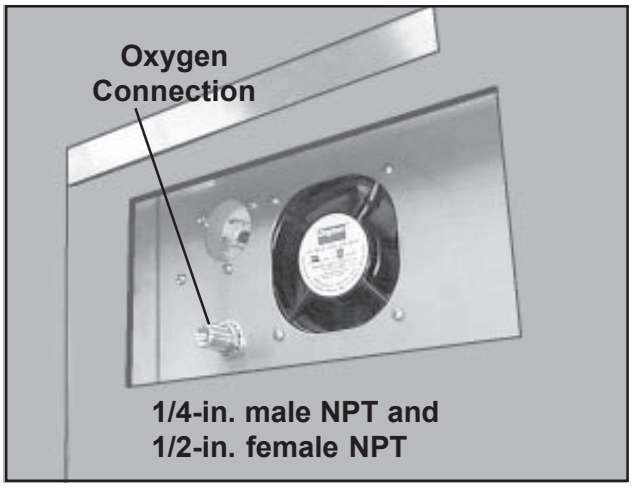

Figure 48. Oxygen Hook-up Connection

6. Push the oxygen on/off switch to On. The amber light in the switch, and the red system light come on. The intake of oxygen causes the black needle on the oxygen concentration meter to move toward the red set-point needle. The system admits oxygen to the animal compartment to maintain the 25% concentration as oxygen is depleted by normal leakage.

7. Push the oxygen on/off switch to Off. The light in the switch goes out.

8. Push the main on/off switch to Off. The light in the switch goes out.

Filling the CO_2 Filter

CAUTION: **Sodalime can cause burns to eyes and skin. Dust can cause irritation to skin and eyes on contact. Harmful if swallowed.**

CAUTION: **Use safety goggles or glasses, PVC or rubber gloves, and a nuisance dust mask when handling Sodalime.**

CAUTION: **Dispose of Sodalime waste and water rinses in accordance with local, state, and Federal regulations.**

CAUTION: **For complete information, refer to the Material Safety Data Sheet (MSDS No. 005213) included in the Appendix to this manual.**

CAUTION: **Wash your hands thoroughly after handling Sodalime.**

The CO_2 filter must be filled before operating the Intensive Care Unit. This insures that respiratory carbon-dioxide from patients in the animal compartment is removed before circulated air is returned to the compartment. A supply of fresh Sodalime is provided with each new Intensive Care Unit.

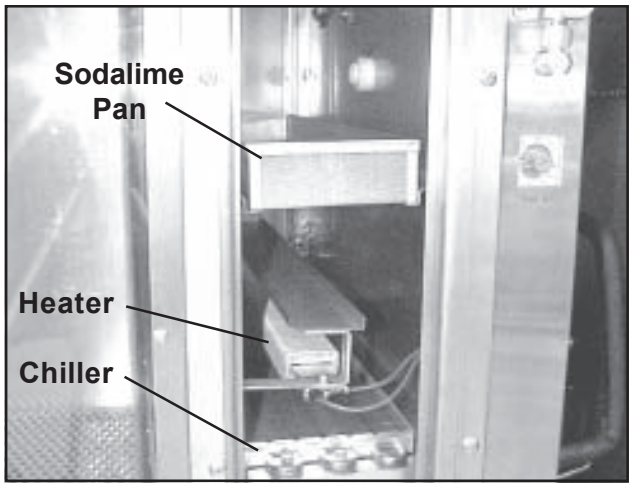

Figure 49. Heater, Chiller, and Sodalime Pan

To fill the Sodalime Pan:

1. Open the filter/fans compartment (refer to *Page 58*).
2. Lift out the Sodalime pan (Figure 49).
3. Open one of the Sodalime containers supplied with the unit.
4. Pour the full contents of the container into the Sodalime pan and smooth it out to an even depth.
5. Replace the Sodalime pan into the filter/ fans compartment.
6. Close and secure the filter/fans compartment front panel.
7 Wash your hands thouroughly.

A single pan of absorbent will normally last for about one month, however, usage factors and environmental conditions can have an impact. For a new supply, call SSCI and order P/N 853439.

Disposition of the Shipping Carton

The shipping carton can be cut up and thrown away. If adequate space is available, however, it might be handy to retain the carton and pallet in case reshipment of the Intensive Care Unit to the manufacturer ever becomes necessary for repairs.

Chapter 4 - Operation & Care

WARNING: **Oxygen is a highly combustible gas. Avoid the use of open flames, smoking materials, or equipment capable of producing sparks in any area in which oxygen is being used. Before servicing or performing maintenance on this equipment, make sure the oxygen supply is turned Off at the source.**

Overview

Operating the Regal Intensive Care Unit

Operating the SSCI Regal Intensive Care Unit is simple and easy. The following instructions cover:

Caring for the Regal Intensive Care Unit

You will no doubt want to clean your Regal Intensive Care Unit whenever it becomes dirty or saturated with waste fluids. Maintaining high standards of sanitation will be an important priority for your facility. Instructions are included for:

Preventive Maintenance for Your Regal Intensive Care Unit

This section gives you a schedule of routine maintenance and procedures that should be performed periodically.

Operating the Regal Intensive Care Unit

Turning the Unit On and Off

To turn the Intensive Care Unit On, press the main on/off switch (Figure 50). The amber light in the switch comes on and all functions: oxygen, heating, cooling, alarm, and floor heating become available. The circulating fans in the filter/fans compartment, and the ventilating fan in the electronics compartment begin to operate. To turn the unit Off, press the main on/off switch again. The light in the switch goes out, all functions are de-activated, and the fans all stop.

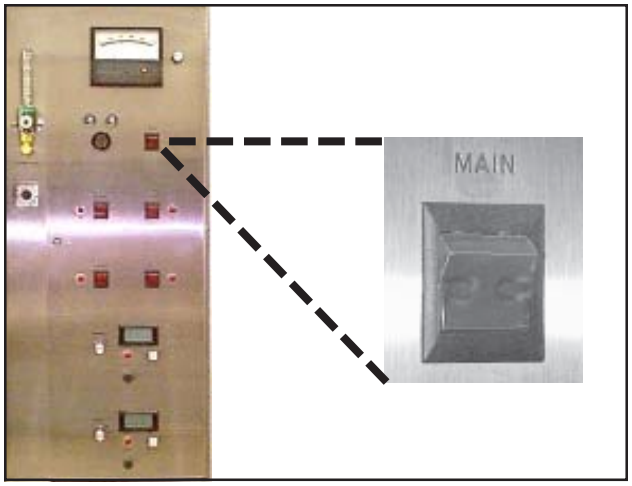

Figure 50. Main On/Off Switch

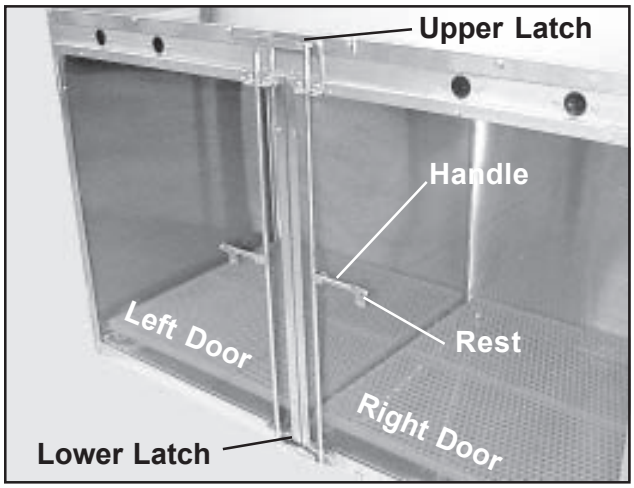

Figure 51. Opening/Closing the Doors

Opening and Closing the Doors

The Intensive Care Unit has two doors that are each held closed by one upper and one lower latch (Figure 50). To open a door, lift the handle free of the rest, rotate the handle outward, and swing the door open. The doors can be opened together or individually, but the right door must be opened first. To close and lock the doors, swing the doors closed (left door first), rotate the handles inward making sure that the upper and lower latches engage, and lower the handles into the rests.

Using the Divider Panels

General

Two removable divider panels are supplied with the unit: a wire grill divider, and a clear acrylic divider. Only one can be installed at a time. A divider panel splits the animal compartment into two half-compartments (refer to *Pages 10* and *11*). The two compartments have individually-controlled heated floors, however, they share the same oxygen supply, heating and cooling.

The only purpose of the clear acrylic divider is to reduce the size of the compartment to minimize oxygen usage when treating smaller animals. **Always use the wire grill divider if animals are present in both compartments.**

WARNING: **Never place an animal in the left compartment if the clear acrylic divider is being used. This divider creates an effective seal, and prevents the flow of air into the left compartment. If this divider is in place, an animal in this compartment can easily suffocate.**

Installation

To install a divider panel:

1. Open both doors.

2. Remove the PVC floor (if installed) in the right compartment.

Note: Notice the guide channels for the divider panels in the rear wall and ceiling of the animal compartment (Figure 52).

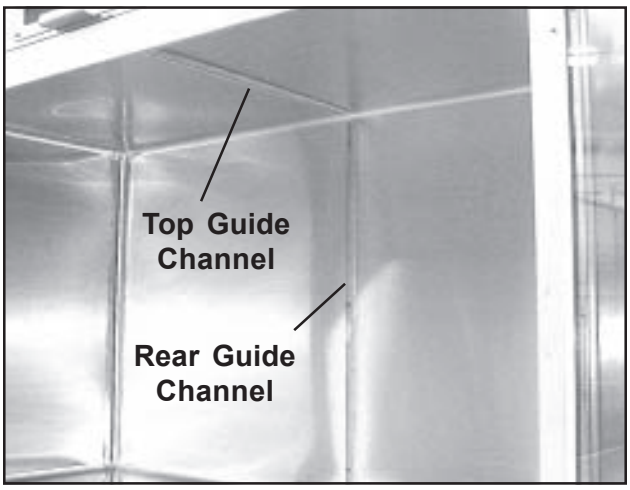

Figure 52. Rear and Top Divider Panel Guide Channels

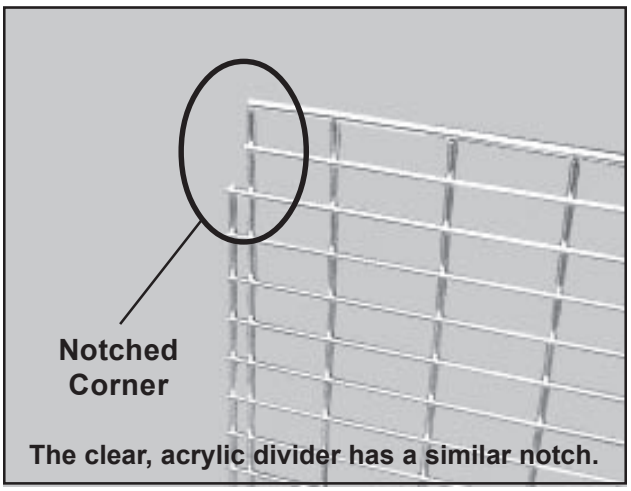

Figure 53. Notched Corner on the Wire Grill Divider Panel.

3. Orient the divider panel so that the notched corner is on top and toward the front (Figure 53).

4. Tilt the top of the divider panel to the left, and place it into the top guide channel.

5. Swing the lower edge of the panel to the left so that it is vertical.

6. Push the panel to the rear so that the back edge seats in the rear guide channel.

7. Replace the PVC floor, if desired.

Removal

1. Open both doors.

2. Remove the PVC floor (if installed) in the right compartment.

3. Grasp the front edge of the divider panel and pull it out until the back edge of the panel clears the rear channel.

4. Tilt the lower edge of the divider panel to the right until the top edge clears the top guide channel.

5. Remove the divider panel from the unit.

6. Replace the PVC floor, if desired.

Using Oxygen

WARNING: **Oxygen is a highly combustible gas. Avoid the use of open flames, smoking materials, or equipment capable of producing sparks in any area in which oxygen is being used.**

WARNING: **Oxygen-in-use warning signs should be prominently displayed in the room where the Intensive Care Unit is used, and on the outsides of all entrance doors to the room.**

WARNING: **Do not place any animal that has been exposed to an explosive gas such as ether into the Intensive Care Unit.**

WARNING: **Do not attempt to use an oxygen concentration greater than 40% unless, in your professional opinion, it is absolutely necessary.**

To supply oxygen to the animal compartment:

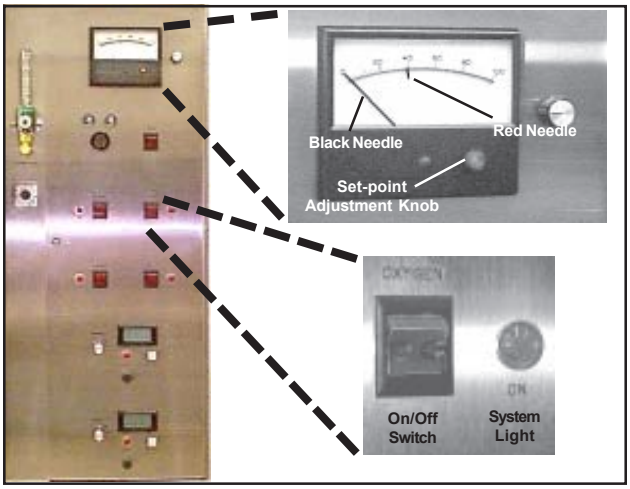

Figure 54. Oxygen Controls

1. Install a divider panel if required (refer to *Page 49*).
2. Push the main on/off switch to On. The amber light in the switch comes on (refer to *Page 48*).
3. Press the oxygen on/off switch. The amber light in the switch comes on (Figure 54). If the set-point needle is to the right of the calibration needle, oxygen begins flowing and the red system light comes on.
4. With the set-point adjustment knob, move the red set-point needle in the oxygen concentration meter to the desired oxygen concentration.
5. If you want the alarm system activated, press the alarm on/off switch to On (refer to *Page 55*).

If the black needle in the meter is to the left of the red needle, the oxygen system will begin supplying oxygen and the system light will come on. If the black needle is to the right of the red needle, the oxygen concentration is higher than called for. The oxygen system will not operate and the system light will not come on.

To stop the oxygen flow, press the oxygen on/off switch. The light in the switch goes out and oxygen flow to the animal compartment ceases. If it was On, the system light goes out.

To control the oxygen flow rate to the animal compartment, refer to *Controlling Oxygen Flow Rate* on *Page 56*. To control oxygen pressure, refer to *Controlling Oxygen Pressure* on *Page 56*.

With the clear acrylic divider panel in place, it takes about 20-minutes to bring the right animal compartment to an oxygen concentration of 40%. Without the clear divider panel, it takes about 30-minutes to bring the full compartment to 40%.

CAUTION: **When using oxygen, all four access knobs on the filter/fans compartment must be firmly locked to prevent oxygen leakage from the animal compartment.**

Heating the Compartment Floor

The floor of the animal compartment contains separate heaters for the left and right sides to provide localized heat control when the compartment is divided into two half-compartments. Two sets of floor heat controls are provided for the left and right heating units. Each set consists of an on/off button, a system light, a temperature controller, and a digital display. To heat the entire compartment floor, turn both left and right heaters On. To provide heat to the compartment:

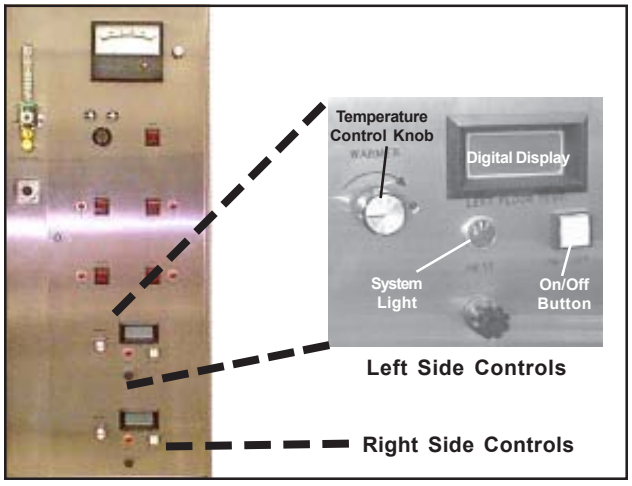

Figure 55. Floor Temperature Contols (Left Shown, Right Identical)

1. Make sure the main on/off switch is On. The amber light in the switch should be on (refer to *Page 48*).

2. Press the appropriate heated floor on/off button (Figure 55). The amber light in the button comes on.

3. With the temperature control knob, set the compartment floor temperature to the desired level. If the actual floor temperature is below the set temperature, the heater starts and the red system light comes on. View the digital display for a readout of the current floor temperature.

To turn heat Off, press the heated floor on/off button. The amber light in the button goes out. If the heater was operating, it stops, and the red system light goes out.

Heating and Cooling - General

Since the temperature in the room in which the unit is installed will probably remain fairly constant, it is unlikely that heavy loads will be placed on the heating and cooling systems. In many cases, the body heat of the patient will be sufficient to maintain a comfortable temperature in the animal compartment.

You can have both heating and cooling systems On at the same time; the unit will automatically activate one system or the other, as needed, to maintain the set temperature.

Heating the Compartment Air

If heat is required by animals in both half-compartments, use the wire grill divider so that air can move freely between the compartments. If only one animal requires heat, and is small enough to fit, place it in the right compartment, and install the acrylic divider (the right compartment contains the air inlet).

To supply heated air to the animal compartment:

1. Install a divider panel if required, (refer to *Page 49*).

2. Make sure the main on/off switch is On. The amber light in the switch must be On refer to *Page 48*).

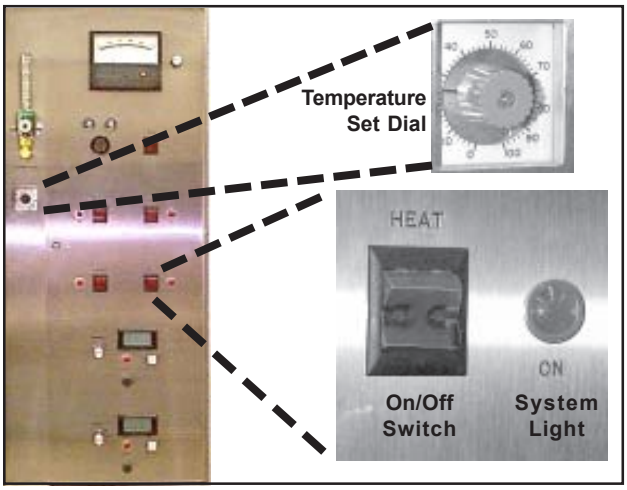

Figure 56. Heat Controls

3. Press the heat on/off switch to turn heat On. The amber light in the switch comes on (Figure 56).

4. Turn the temperature set dial to the desired temperature. If the temperature in the compartment is below the set temperature, heat is supplied and the red system light comes on. The temperature of the air in the animal compartment can be read on the digital readout (refer to *Page 24*).

5. When the compartment air reaches the set temperature, the system light goes out.

To turn heat Off, press the heat on/off switch. The light in the switch goes out. If the heating system was operating, it stops, and the system light goes out.

Cooling the Compartment Air

If cooling is required by animals in both half-compartments, use the wire grill divider so that air can move freely between the compartments. If only one animal requires coolong, and is small enough to fit, place it in the right compartment, and install the acrylic divider (the right compartment contains the air inlet).

To supply cooled air to the animal compartment:

1. Install a divider panel if required, (refer to *Page 49*).

2. Make sure the main on/off switch is On. The amber light in the switch must be On (refer to *Page 48*).

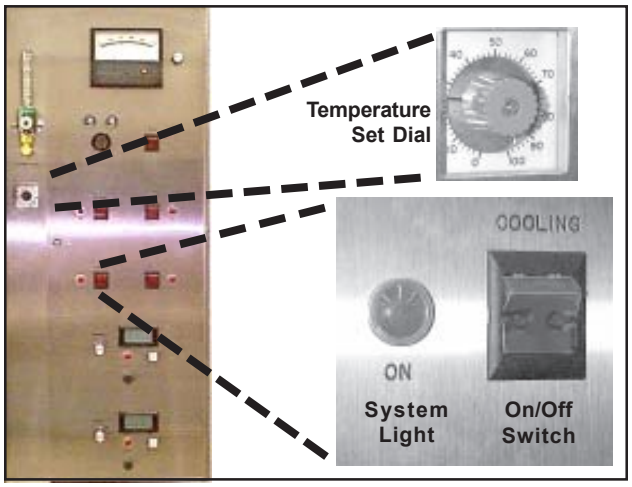

Figure 57. Cooling Controls

3. Press the cooling on/off switch to turn cooling On. The amber light in the switch comes on (Figure 57).

4. Turn the temperature set dial to the desired temperature. If the temperature in the compartment is above the set temperature, cooling is supplied and the red system light comes on. The temperature of the air in the animal compartment can be read on the digital readout (refer to *Page 24*).

When the compartment air reaches the set temperature, the system light goes out.

To turn cooling Off, press the cooling on/off switch. The light in the switch goes out. If the cooling system was operating, it stops, and the system light goes out.

Using the Alarm System

The alarm system alerts you, with audible and visual signals, whenever there is a problem with the oxygen supply or concentration.

Turning the alarm system on

1. Make sure the main on/off switch is On. The amber light in the switch should be On (refer to *Page 48*).

2. Make sure the oxygen on/off switch is On. The amber light in the switch should be On (refer to *Page 51*).
   Note: The alarm system only operates when the oxygen system is On.

3. Push the alarm on/off switch to On. The amber light in the switch comes on (Figure 58). The alarm system is now in the operating mode.

Turning the alarm system off

Push the alarm on/off switch to Off. The light in the switch goes out.

Recognizing an alarm

When an alarm occurs, the audible alarm sounds and the red alarm system light comes on.

Responding to an alarm

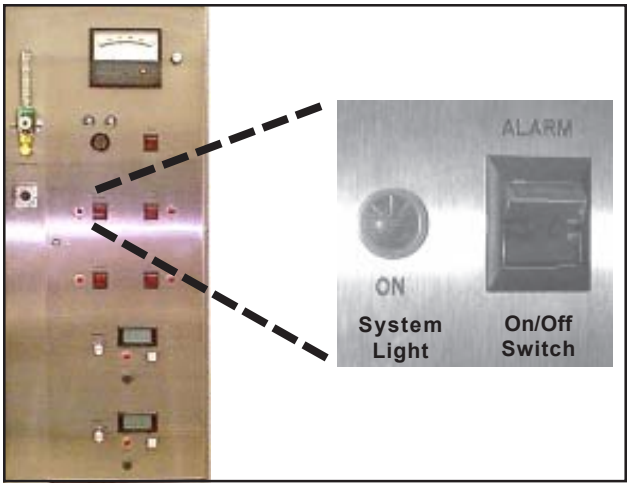

Figure 58. Alarm Controls

1. Push the five system on/off switches to Off , starting at the oxygen on/off switch and proceeding down (heat, cooling, alarm, left floor heat, right floor heat). The lights in all the switches, and all system lights go out.

2. Push the main on/off switch to Off. The light in the switch goes out (refer to *Page 48*).

3. Locate and fix the problem.

4. Re-start the unit and continue normal operating procedures.

If the oxygen system experiences a minor, transient fault and then corrects itself, the alarm may sound briefly and then stop. In this case, it is not necessary to shut down the unit and you may continue normal operations. If this happens frequently, however, check the oxygen system and try to locate and correct the problem.

The alarm system includes a time delay to minimize alarms due to minor, transient faults. For more information, refer to *Setting the Time Delay Relay* on *Page 59*.

Controlling Oxygen Pressure

There is no oxygen pressure adjustment in the Intensive Care Unit. To increase or decrease oxygen pressure to the Intensive Care Unit, adjust the regulator at the oxygen supply source.

Controlling Oxygen Flow Rate

The oxygen flow rate is controlled by a flow rate meter and adjustment knob (Figure 59) on the front of the electronics compartment. The meter is calibrated from 1/2 to 15 lpm (liters-per-minute).

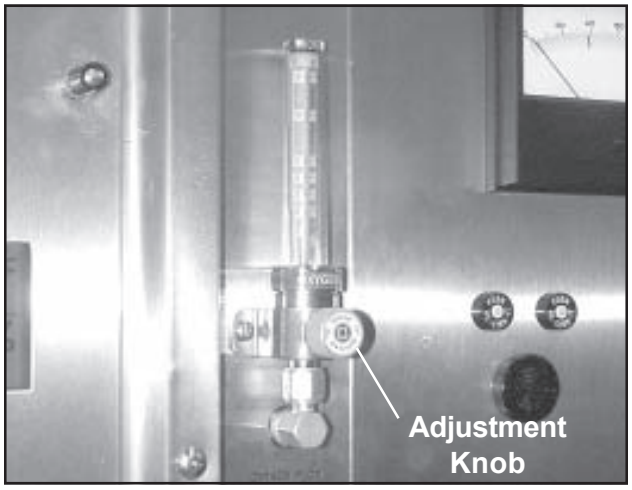

Figure 59. Oxygen Flow Meter and Adjustment Knob

SSCI recommends an intake pressure of 10 to 20 psi with a flow rate of 15 lpm. Your experience may indicate that a greater or lower pressure and/or flow rate are desirable.

To increase the flow rate, turn the adjustment knob clockwise. To reduce the flow rate, turn the knob counter-clockwise. Take your readings from the center of the ball in the transparent, graduated tube on top the meter.

Accessing the Electronics Compartment

CAUTION: **Opening the electronics compartment door exposes electrical components inside. Use caution around electric wiring and components to prevent injury to yourself and/or damage to the equipment. Before working in the electronics compartment, press the main on/off switch to Off, and un-plug the electric power cord unless electric power is required for servicing.**

To gain access to the electronics compartment, turn the panel access knob one-quarter turn counter-clockwise and pull the panel open (Figure 60). The panel is hinged on the right side and opens like a door.

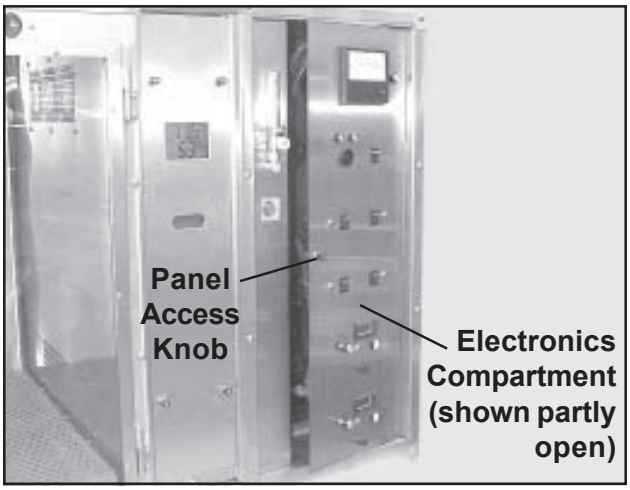

Figure 60. Electronics Compartment Access Knob

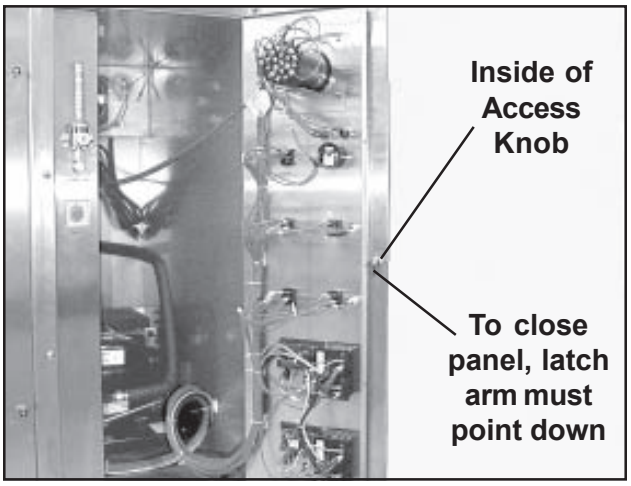

Figure 61. Electronics Compartment Panel Interior

To close and lock the compartment, check the inside of the panel and verify that the latch arm is pointed down (Figure 61). Then, swing the panel closed and turn the panel access knob one-quarter turn clockwise.

Accessing the Filter/ Fans Compartment

Opening the filter/fans compartment panel exposes electrical components inside. Use caution around electric wiring and components to prevent injury to yourself and/or damage to the equipment. Before working in the filter/fans compartment, press the main on/off switch to Off, and un-plug the electric power cord unless electric power is required for servicing.

Whereas the electronics compartment panel swings open on hinges like a door, the filter/fans compartment panel detaches from the unit entirely.

To gain access to the filter/fans compartment, turn all four panel access knobs (Figure 62) one-quarter turn counter-clockwise and lift the panel completely off the Intensive Care Unit.

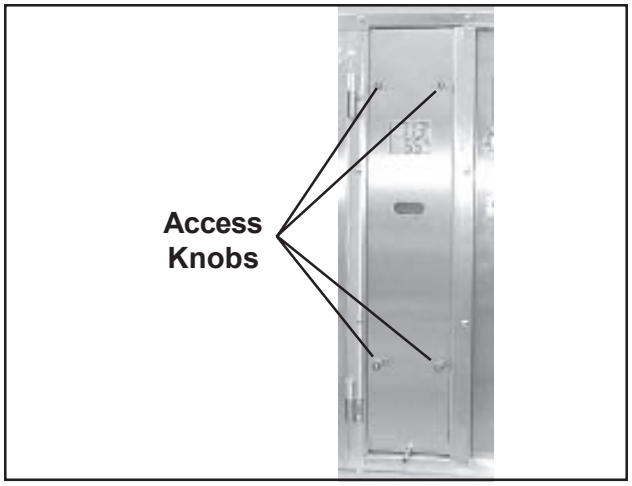

Figure 62. Filter/Fans Compartment Access Knobs

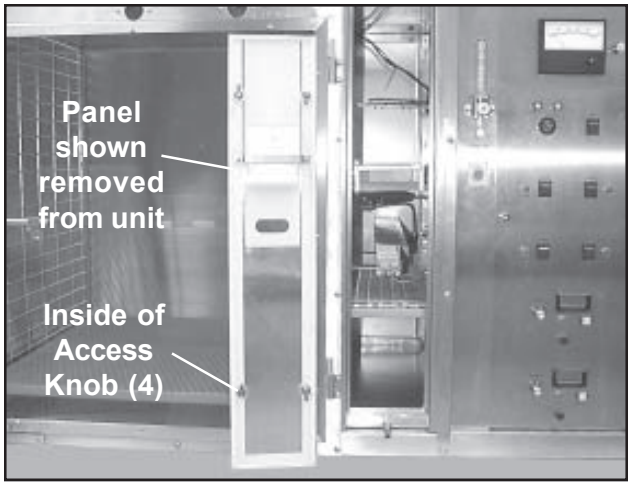

Figure 63. Filter/Fans Compartment Panel Open

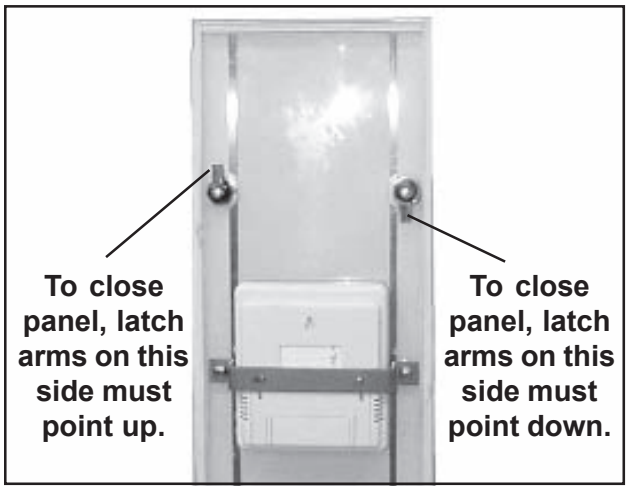

Figure 64. Inside of Filter/Fans Compartment Panel

When closing the filter/fans compartment, first look at the rear of the access panel (Figure 64). Make sure that the locking arms on all four access knobs are vertical. Note that the locking arms on the right point down, and that the arms on the left point up. Then, seat the panel in place over the filter/fans compartment opening, and turn all four panel knobs one-quarter turn clockwise to lock the panel in place. **Note:** It is a good idea to tug gently on one of the access knobs to be sure the panel is secure.

CAUTION: **All four access knobs on must be firmly locked to prevent oxygen leakage from the animal compartment.**

Setting the Alarm Time Delay Relay

This component determines how soon that the alarm will go off after a malfunction of the oxygen system occurs. The relay controls the delay time from two to 300-seconds (five-minutes). We recommend a time delay of about 30-seconds. This gives you adequate warning of problems in the oxygen system without alerting you to minor, transient faults.

To change the time delay:

1. Open the electronics compartment (refer to *Page 57*).
2. Locate the alarm time delay relay (Figure 65).
3. Turn the dial on the relay to the desired time delay setting (Figure 66).
4. Close and secure the electronics compartment.

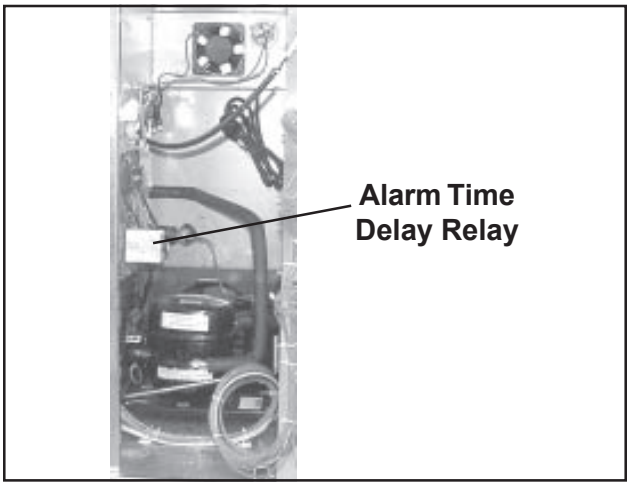

Figure 65. Alarm Time Delay Relay in the Electronics Compartment

Figure 66. Alarm Time Delay Dial

Changing the Digital Readout Between F° and C°

The digital readout can be set to display temperature in degrees-Fahrenheit or degrees-Centigrade. Be aware, however, that the temperature set dial, the digital displays, and the temperature controllers in the floor heat controls are calibrated in degrees-Fahrenheit only. To change the digital readout between F° and C°:

1. Open the filter/fans compartment (refer to *Page 58*).
2. On the rear of the filter/fans compartment panel, locate the digital readout (Figure 67).

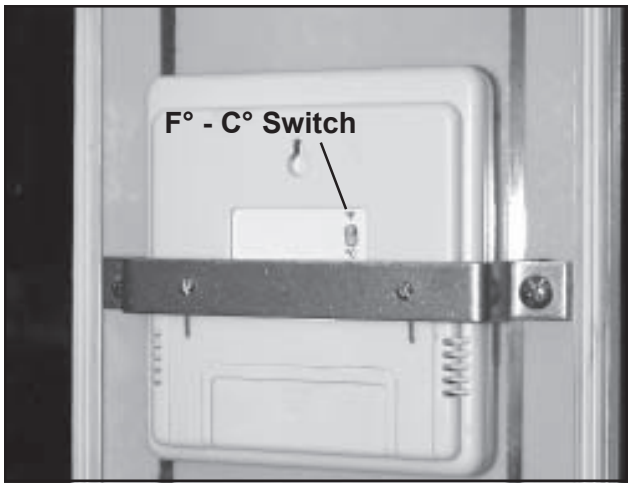

Figure 67. Rear of the Digital Readout

3. On the rear of the digital readout, click the switch labeled **F°- C°** (Figure 67) to the desired setting.

4. Replace and secure the compartment panel.

Re-setting the Circuit Breakers

Two 10 amp. circuit breakers are provided on the face of the electronics compartment (Figure 68). Circuit breakers are safety devices that shut down electrical power to the unit should an overload or short circuit occur.

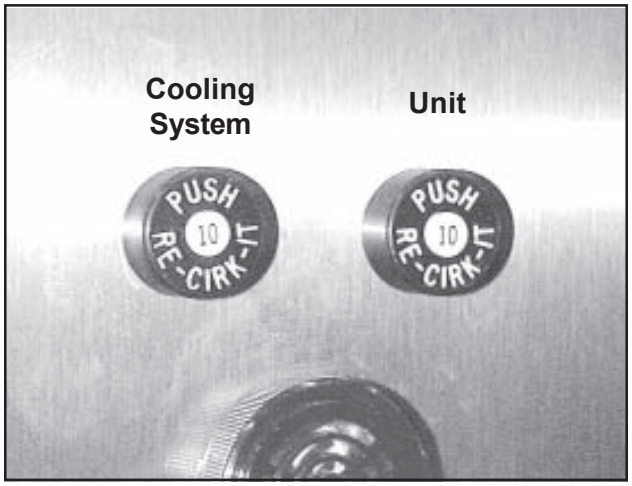

Figure 68. Circuit Breakers

The left breaker (viewed from the front) protects the cooling system. The right breaker protects the remainder of the unit.

When operating normally and not "tripped", the white button in the center of the circuit breaker is level with the black outer ring of the breaker. When "tripped" the white button projects about 1/8-in. out from the black outer ring.

Should a circuit breaker trip, wait at least 10-seconds, then press the white button in to reset it.

Occasional tripping of a circuit breaker is not a cause for concern, however, if circuit breakers trip frequently, it may be a sign of problems in the unit's electrical system. The unit should be checked and repairs made as needed.

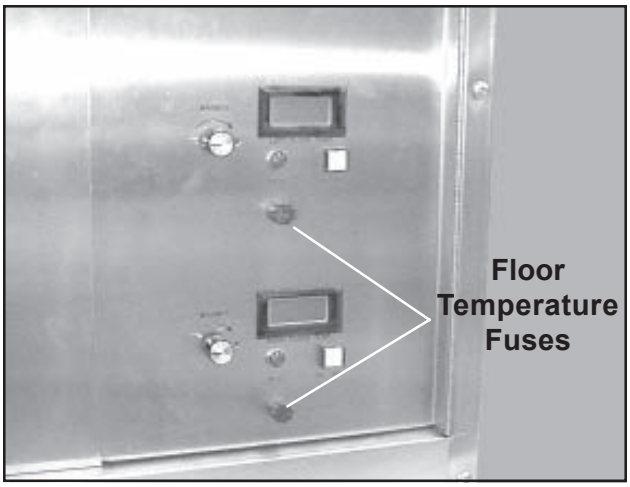

Figure 69. Floor Temperature Fuses

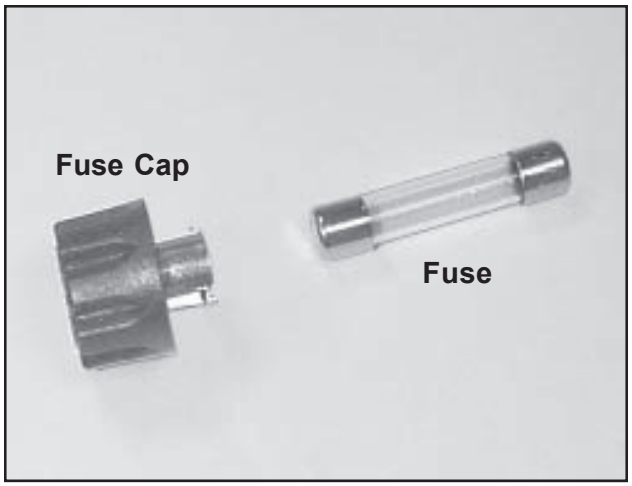

Figure 70. Fuse Cap and Fuse

Replacing Floor Temperature Fuses

Two fuses are provided for protection of the left and right floor temperature systems (Figure 68). Both fuses are 3AG fast-acting, 250 V, 2 amp. If you need replacement fuses you can order them from SSCI, however, they are standard items and can be obtained faster and cheaper at your local hardware or electronics supply store.

Removal

Press in on the fuse cap, then twist about one-quarter turn counter-clockwise, and pull out the fuse cap and fuse (Figure 70).

Inspection

Inspect the thin, curly metal wire inside the transparent center section of the fuse (Figure 70). If the wire is intact, the fuse is OK. If the wire is burned or broken, the fuse is bad and must be replaced.

Installation

1. Place either end of the fuse into the fuse cap.

2. Engage the "ears" behind the fuse cap into the gaps in the fuse holder.

3. Press in on the fuse cap, and turn about one-quarter turn clockwise until it snaps into place.

Replacing the Digital Readout Battery

The digital readout operates independently of the other components in the ICU, and is powered by its own Type AAA battery. To change the battery:

1. Open the filter/fans compartment panel (refer to *Page* 58).
2. On the rear of the digital readout, remove the battery cover (Figure 71).
3. Remove the old battery.
4. Install a new Type AAA battery (Figure 72). Position the (+) electrode to the left.
5. Replace the battery cover.
6. Close and secure the filter/fans compartment.

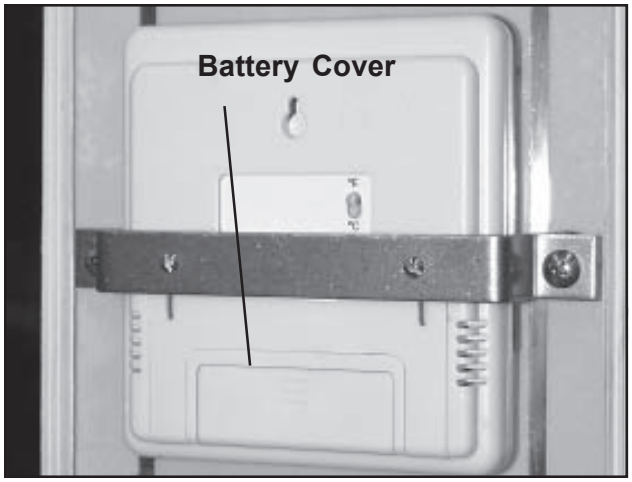

Figure 71. Digital Readout Battery Cover

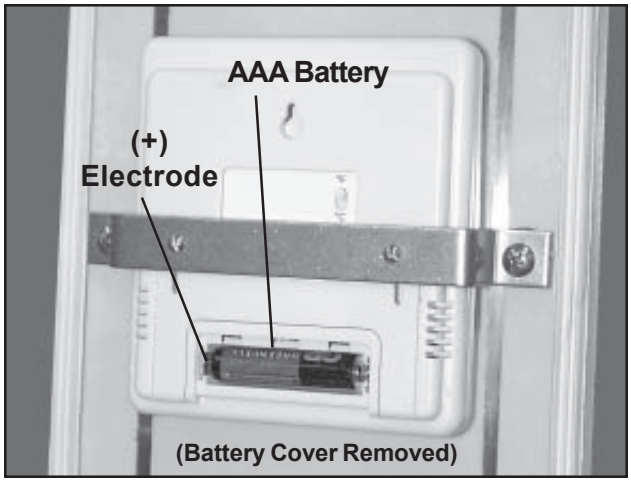

Figure 72. Digital Readout Battery

Cleaning the Regal Intensive Care Unit

Stainless Steel Cleaning Procedures

Ordinary deposits of waste and fluids can usually be removed with soap and water. Stubborn deposits may require scrubbing with "stainless steel" wool, nylon, or plastic scrubbers and/or the use of commercial cleaning products. Always scrub in the direction of the "grain" of the metal. Rinse with clear water and dry thoroughly with a clean, soft cloth.

Minor scale build-up and some hard water spotting may be removed by washing with vinegar, followed by a neutralizing rinse of clear water, and a thorough drying with clean, soft cloths.

For heavy deposits of scale, 5% oxalic acid (use warm), 5-15% sulfamic acid, or 5-10% phosphoric acid may be used. As always, rinse with clear water and dry thoroughly with clean soft cloths.

Avoid prolonged use of chlorides (such as chlorine bleach), bromides, iodides and thiocyanates. Never allow salty solutions to dry on the stainless steel. **Note:** NEVER power-wash the Intensive Care Unit.

Cleaning the Doors and Divider Panels

The clear acrylic portions of the doors and divider panels can be cleaned with plain soap and water, or with a mild commercial glass cleaner. Always use clean, soft cloths and keep in mind that hard scrubbing can scratch the panels. Thoroughly rinse with cold water and dry completely. Clean any heavy deposits of animal fluids off the door and divider panels as soon as possible before they harden.

The wire grill divider and the metal frames of the doors are stainless steel and should be cleaned in accordance with *Stainless Steel Cleaning Procedures* above.

Cleaning the Removable PVC Floors

The removable orange PVC floors are best cleaned with a hose, a quality brush (not a wire brush), and any commercial soap or detergent. Rinse thoroughly and dry with a clean, soft cloth. Clean any heavy deposits of animal fluids off the floors as soon as possible before they harden.

Preventive Maintenance for Your Regal Intensive Care Unit

Introduction

The Regal Intensive Care Unit is a very sturdy and durable piece of equipment. Like any mechanical device, however, the unit will benefit from proper care and occasional attention. These simple, minimal, preventive maintenance procedures will help guarantee a long and useful life for your unit. Such maintenance includes:

Maintenance Schedule

The Preventive Maintenance Schedule shown in Table 2 outlines the normal, recommended frequency for the specified procedures. This program assumes normal usage and environmental factors. Over time, experience with your Intensive Care Unit may dictate longer or shorter maintenance intervals.

Interval	Procedure	Page Ref.
Daily or as needed	Clean the Intensive Care Unit	*Page 63*
Monthly	Re-fill the CO_2 Filter	*Page 65*
	Clean the Filter/Fans Compartment Filter	*Page 67*
Semi-Annually	Clean the Cooling Coil	*Page 67*
Annually	Replace the Fuel Cell	*Page 68*
	Clean the Filter/Fans and Electronics Compartments	*Page 70*

Table 2. Preventive Maintenance Schedule

Re-filling the CO_2 Filter

CAUTION: **Sodalime can cause burns to eyes and skin. Dust can cause irritation to skin and eyes on contact. Harmful if swallowed.**

CAUTION: **Use safety goggles or glasses, PVC or rubber gloves, and a nuisance dust mask when handling Sodalime.**

CAUTION: **Dispose of Sodalime waste and water rinses in accordance with local, state, and Federal regulations.**

CAUTION: **For complete information, refer to the Material Safety Data Sheet (MSDS No. 005213) included in the Appendix to this manual.**

CAUTION: **Wash your hands thoroughly after handling Sodalime.**

A quantity of Sodalime absorbent is carried in a pan inside the filter/fans compartment. Circulating air leaving the animal compartment is directed over this substance which removes the carbon-dioxide.

The CO_2 filter monitoring window (*Page 25*) allows you to view the Sodalime carbon-dioxide filter to determine its current condition. When fresh, the Sodalime is off-white in color. As it absorbs CO_2, it slowly darkens and ultimately becomes a deep brown. When it is fully saturated it must be replaced as it is no longer effective.

A single pan of absorbent will normally last for about one month, however, usage factors and environmental conditions can have a substantial impact. A supply of fresh Sodalime is provided with each new Intensive Care Unit. To order more Sodalime, call SSCI and order P/N 853439.

To re-fill the Sodalime supply:

1. Open the filter/fans compartment (refer to *Page 58*).

2. Carefully, and without spilling the contents, lift up, and remove the Sodalime pan (Figure 73).

3. Empty the Sodalime pan, and wash and dry it thoroughly.

Dispose of Sodalime waste and water rinses in accordance with local, state, and Federal regulations.

4. Open a single container of Sodalime.

5. Pour the full contents of the container into the pan and smooth it out to an even depth.

6. Carefully, replace the filled pan into the compartment.

7. Replace and secure the compartment panel.

8. When you are finished, wash your hands thoroughly.

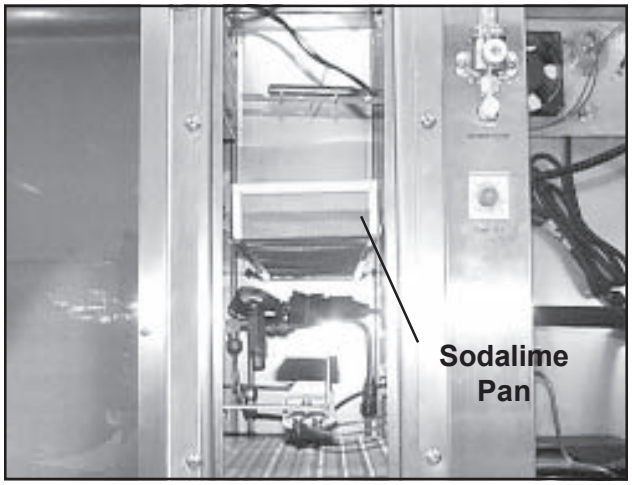

Figure 73. Sodalime Pan in Filter/Fans Compartment

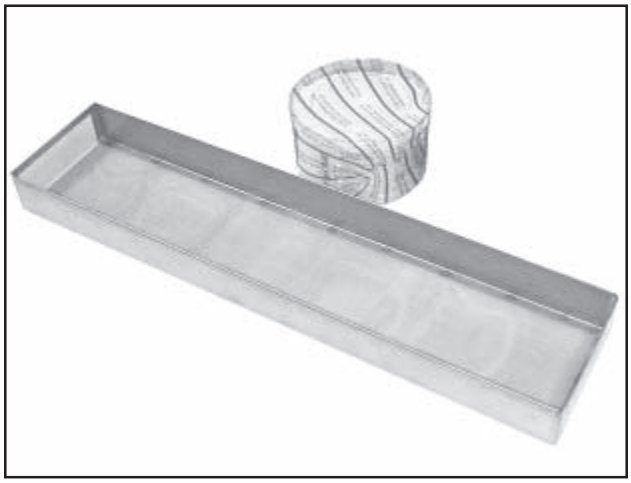

Figure 74. Sodalime Container and Pan

Sodalime Storage

Store Sodalime containers in a clean, dry environment, and avoid direct exposure to sunlight. Do not open Sodalime containers until ready for use.

Cleaning the Filter/ Fans Compartment Filter

A metal mesh filter in the filter/fans compartment (Figure 75) cleans air returning to the filter/fans compartment from the animal compartment. Its purpose is to remove animal hair and other contaminants from the circulating air before it passes through the Sodalime filter. To clean the filter:

1. Access the filter/fans compartment (*Page 58*).
2. Gently bend the filter until the top or bottom edge clears the top or bottom holding bracket.
3. Remove the filter from the unit.
4. Wash the filter thoroughly in hot, soapy water, and dry completely.
5. Re-install the filter into the filter/fans compartment.
6. Close and lock the front panel.

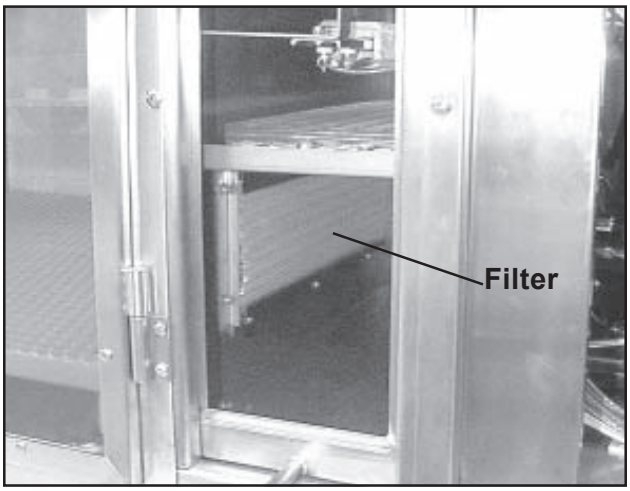

Figure 75. Filter/Fans Compartment Filter

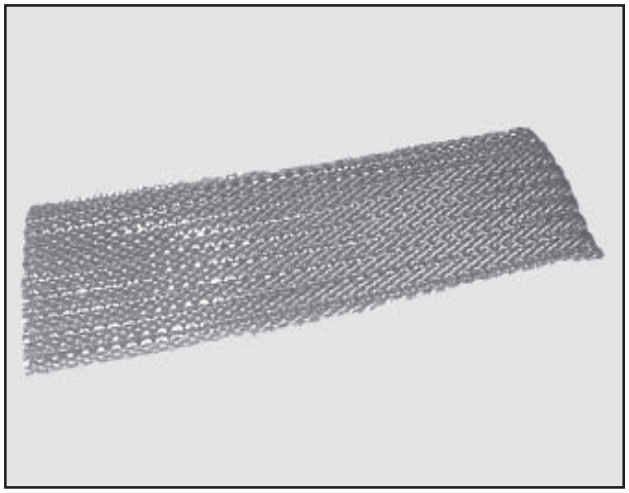

Figure 76. Filter/Fans Compartment Filter

Cleaning the Cooling Coil

Over time, dust and other debris tend to accumulate on the outside face of the cooling coil (Figure 77). This material reduces the efficiency of the coil and causes the cooling system to work harder than necessary. This, in turn, causes excess wear on the cooling system and can shorten its life.

Cleaning this coil every six months is usually sufficient to maintain the coil's effectiveness, however, it may be necessary to reduce this interval in exceptionally dusty climates. With a brush attachment on a vacuum cleaner, vacuum the accumulated dust and debris from the outside of the cooling coil.

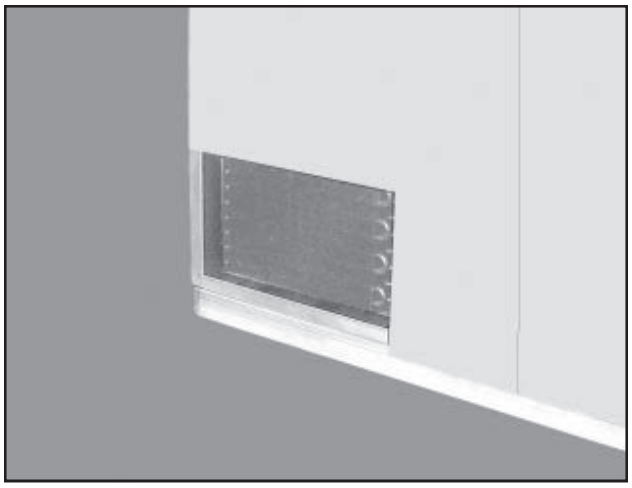

Figure 77. Cooling Coil in Rear of Unit

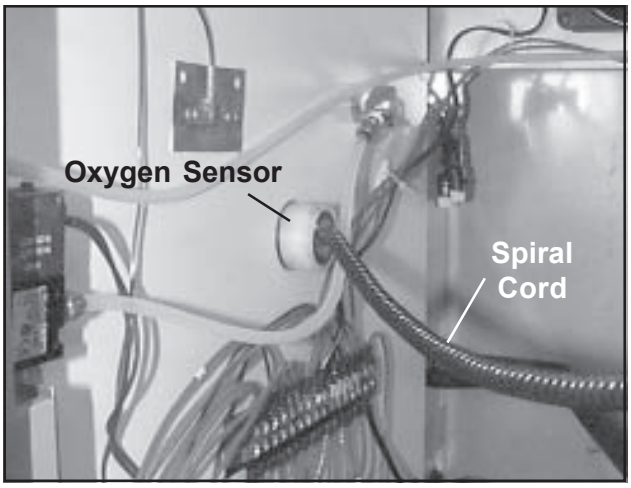

Figure 78. Oxygen Sensor Inside the Electronics Compartment

Replacing the Fuel Cell

CAUTION: **Do not remove the fuel cell from the bag until ready to use.**

CAUTION: **Wear safety glasses when handling the fuel cell.**

CAUTION: **Avoid contact with the sensing surface.**

CAUTION: **The fuel cell contains lead, a chemical known to cause cancer, birth defects, or other reproductive harm.**

CAUTION: **Wash your hands thoroughly after handling the fuel cell.**

The fuel cell powers the black calibration needle in the oxygen concentration meter. The cell has an average life of about one year, depending on frequency of use. Difficulty in moving the black calibration needle in the oxygen concentration meter is usually an indication of an exhausted fuel cell. Order replacements from SSCI, P/N 853396. To replace the fuel cell:

1. Open the brown box, then open the plastic bag inside and take out the fuel cell.

2. Open the electronics compartment (refer to *Page 57*).

3. Open the filter/fans compartment (refer to *Page 58*).

4. Inside the filter/fans compartment, notice the installation of the oxygen sensor (Figure 79).

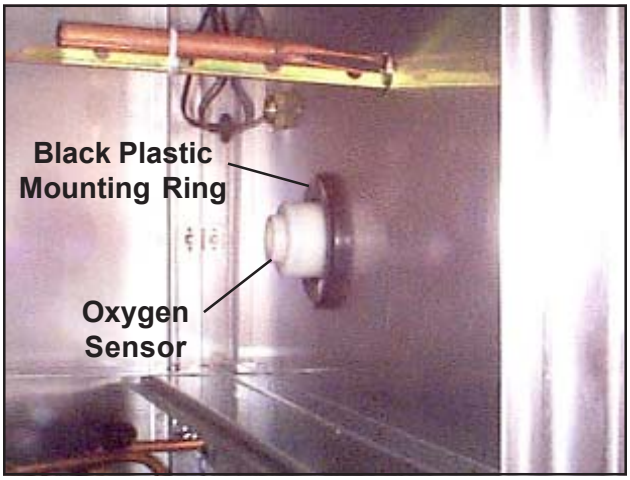

Figure 79. New Style Oxygen Sensor Mount

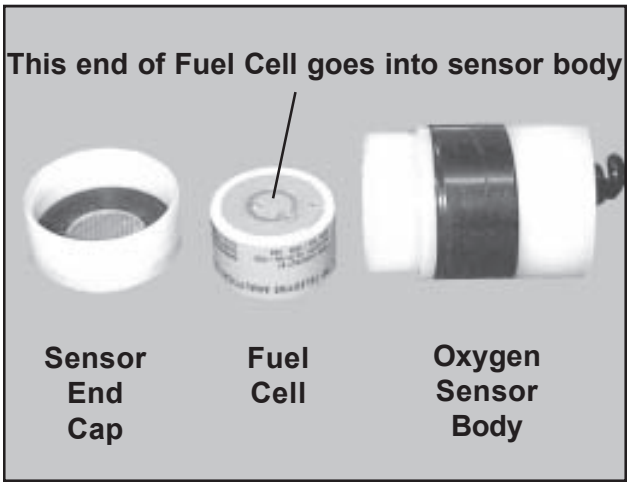

Figure 80. Fuel Cell and Oxygen Sensor Assembly

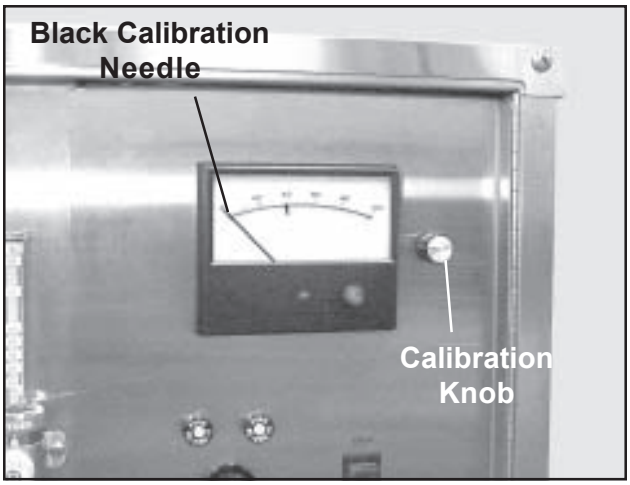

Figure 81. Oxygen Concentration Meter and Calibration Knob

- If the oxygen sensor is mounted in the large black plastic ring, you have a New Style Intensive Care Unit (produced after January 1, 2005). Proceed to ***New Style Units*** on *Page 70*.

- If this large black ring is not present, you have an Original Style Intensive Care Unit (produced before January 1, 2005). Follow the instructions under ***Original Style Units*** below.

Original Style Units:

1. In the electronics compartment (Figure 78) twist the sensor slightly, and pull it out of the compartment wall. **Note:** Do not try to detach the spiral cord from the sensor.

2. Unscrew the end cap from the oxygen sensor (Figure 80).

3. Remove and discard the old fuel cell.

Dispose of used fuel cells in accordance with local, state, and Federal regulations.

4. On the new fuel cell, remove the shorting button - refer to the instructions packed with the fuel cell.

Note: Watch the oxygen concentration meter (Figure 81) as you perform *Step 5*. The black calibration needle moves to the right, then settles down.

5. Place the fuel cell into the oxygen sensor body. The end of the fuel cell with the metal disk goes in first.

6. Gently, screw the sensor end cap back on. Be careful, the threads are very fine and are easily damaged.

7. Re-insert the oxygen sensor into the wall.

8. Proceed to *Finish the Installation* on *Page 70*.

New Style Units

1. Do not remove the oxygen sensor from the partiion wall.

2. With the oxygen sensor in place in the partition wall, unscrew the end cap from the oxygen sensor (Figure 79).

3. On the fuel cell, remove the shorting button - refer to the instructions packed with the fuel cell.

Note: Watch the oxygen concentration meter (Figure 38) as you perform *Step 4*. The black calibration needle moves to the right, then settles down.

4. Place the fuel cell into the oxygen sensor body. The end of the fuel cell with the metal disk goes in first.

5. Gently, screw the sensor end cap (Figure 80) back on. Be careful, the threads are very fine and are easily damaged.

6. Proceed to *Finish the Installation* below.

Finish the Installation

1. Close and secure the electronics compartment door.

2. Close and secure the filter/fans compartment.

3. Using the calibration knob (Figure 81), position the black needle in the oxygen concentration meter to 20.5% (the percentage of oxygen in atmospheric air).

4. When you are finished working with the fuel cell, wash your hands thoroughly.

Cleaning the Filter/Fans and Electronics Compartments

Dust, animal hair and other debris can accumulate in the filter/fans and electronics compartments. It is good practise to occasionally vacuum out these compartments to help maintain the Intensive Care Unit at a high efficiency level.

Chapter 5 - Repairs & Replacements

WARNING: **Oxygen is a highly combustible gas. Avoid the use of open flames, smoking materials, or equipment capable of producing sparks in any area in which oxygen is being used. Before servicing or performing maintenance on this equipment, make sure the oxygen supply is turned Off at the source.**

Replacement Parts

Table 3 lists the replacement parts available for the SSCI Regal Intensive Care Unit. For parts not listed, contact the SSCI Customer Service Department at 1-800-323-7366. To order parts, refer to *Parts Ordering Procedure* on *Page 73*.

Part Name	SSCI Part Number	Quantity	Replacement Instructions
Compartment Door	205994 & 205995	1 ea.	*Page 74*
Door Hinge	212035 & 212036	2 ea.	*Page 75*
Door Gasket	754455	-	*Page 76*
Latch Connector Rest	618472	2	*Page 77*
Latch Connector Holder	618479	4	*Page 78*
Latch Connector	212047	2	*Page 79*
Latch Bracket	618480 & 618481	1 ea.	*Page 80*
Divider Panel	206001 & 749575	1 ea.	*Page 81*
Seal, IV Port	752100	4	*Page 82*
Electric Power Cord	853431	1	*Page 83*
Removable PCV Floor	102275-00	2	*Page 84*
Fuel Cell	853396	1	*Page 85*
Oxygen Sensor	853395	1	*Page 88*
Oxygen Concentration Meter	853436	1	*Page 92*
Knob	853461	3	*Page 95*
Potentiometer, Calibration	853397	1	*Page 96*

Table 3. Replacement Parts for the Regal Intensive Care Unit - *cont'd next page*

Part Name	SSCI Part Number	Quantity	Replacement Instructions
Circuit Breaker	853466	2	*Page 98*
On/Off Rocker Switch (Main, Alarm, Oxygen, Cooling, & Heat)	853422	5	*Page 99*
On/Off Button (Floor Temperature)	212242	2	*Page 101*
System Light	854589	6	*Page 104*
Digital Display, Floor Temperature	853843	2	*Page 105*
Fuse, Floor Temperature	853848	2	*Page 107*
Fuse Holder, Floor Temperature	853671	2	*Page 108*
Floor Temperature Controller	853844	2	*Page 109*
Panel Latch	853561	5	*Page 112*
Thermostat	853421	1	*Page 113*
Audible Alarm	853458	1	*Page 116*
Solenoid Valve	853440	1	*Page 118*
Oxygen Flow Meter	853456	1	*Page 120*
Fan, Ventilating (Electronics Compartment)	853414	1	*Page 123*
Alarm Time Delay Relay	853416	1	*Page 124*
Octal Base (Alarm Time Delay Relay)	853871	1	*Page 125*
Relay	853415	1	*Page 126*
Digital Readout	854591	1	*Page 127*
Panel, Filter/Fans, Complete	206874	1	*Page 128*
Gasket, Filter/Fans Compartment	754456	-	*Page 129*
Filter, Filter/Fans Compartment	853469	1	*Page 130*
Sodalime Pan	206537	1	*Page 131*
Heater, Electric	853455	1	*Page 132*
Fan, Circulating (Filter/Fans Compartment)	853414	3	*Page 134*

Table 3. Replacement Parts for the Regal Intensive Care Unit

General Information

- Many of the threaded fasteners used on SSCI products are secured with thread adhesive to insure structural integrity. Removing any screw or bolt may be difficult at first.
- If during dis-assembly, you remove any tape, cable ties, etc. remember to replace them as you re-assemble the unit.
- During dis-assembly, retain all hardware items such as screws, nuts, lockwashers, etc. for re-assembly.
- If you have problems with any procedure, please feel to call SSCI Customer Service.

Parts Ordering Procedure

Order new equipment, accessories, and/or replacement parts directly through the SSCI Customer Service Department. You can order by mail, telephone, or fax. Refer to *SSCI Contact Information* on *Page 7* for address, telephone and fax numbers. When ordering parts, please provide the following information:

- Your name
- Company name
- Company account number
- Your telephone number
- Shipping address
- Billing address (if different from shipping address)
- Names, part numbers, and quantities of items being ordered
- Credit card number and expiration date, or other payment information
- Preferred method of shipment
- Information on whether the items are required on a normal or urgent basis

Preventive Maintenance

For information on Preventive Maintenance and a suggested Maintenance Schedule, refer to *Page 64*.

WARNING: **Do not attempt to work on or dis-assemble the cooling unit as it contains MP39 refrigerant gas under pressure. If service is required on the unit, call SSCI Customer Service at 1-800-323-7366, or a certified refrigeration serviceman.**

Parts Replacement Procedures

Compartment Door

Left - P/N 205994
Right - P/N 205995

The two animal compartment doors on the Intensive Care Unit are similar and are removed and installed in the same way.

Procedure

1. Open the door.

2. Lift the complete door up until the upper halves of both door hinges come free of the lower halves (Figure 82).

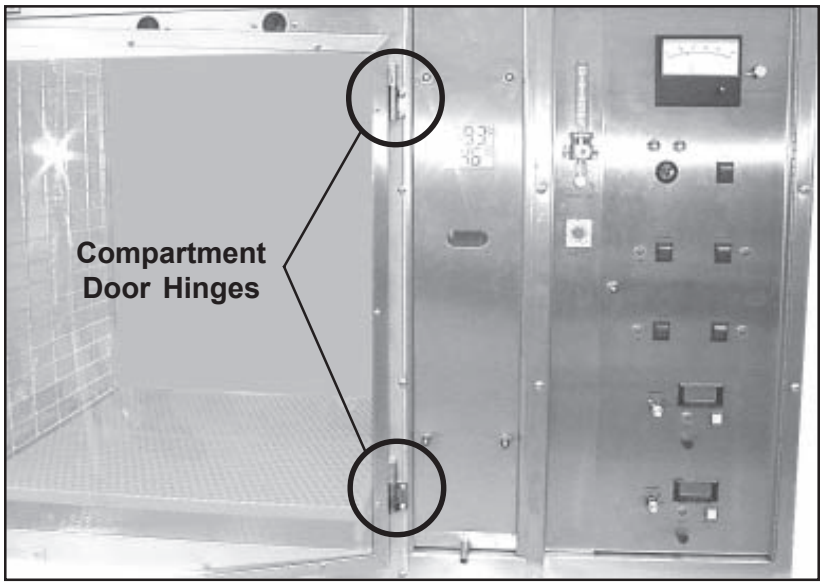

Figure 82. Compartment Door Hinges

3. Holding the door firmly, align the pins in the upper halves of both door hinges with the holes in the lower halves, and gently lower the door onto the hinges (Figure 82).

4. Gently swing the door open and closed several times to make sure it moves freely.

5. Close and latch the door.

Door Hinge

Left Door - P/N 212035
Right Door - P/N 212036

There is one upper and one lower hinge for each compartment door (Figure 82). The hinges on both doors are identical and all are removed and installed the same way. Each hinge has an upper and lower half. **Note:** These instructions tell you how to replace the *lower half only*. The upper half is welded to the door and cannot be replaced other than by replacing the complete door.

Tool Required

- Flat-blade screwdriver

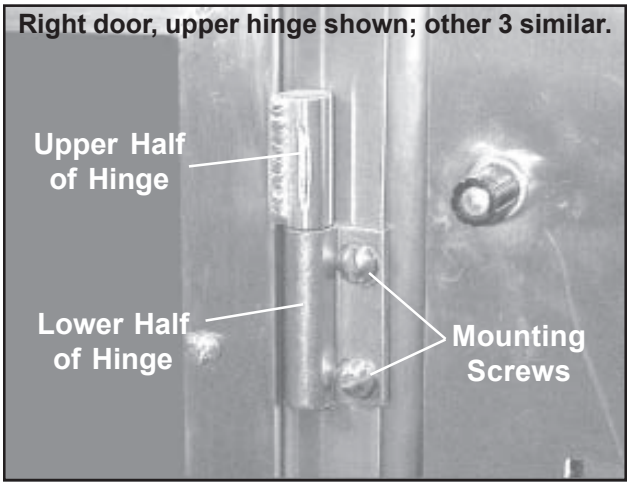

Figure 83. Door Hinge and Mounting Screws

Removal

1. Open the door.
2. Grasp the door firmly and lift up until the upper halves of both door hinges come free of the lower halves (Figure 83).
3. With a flat-blade screwdriver, remove the two mounting screws and remove the hinge from the unit.

Installation

1. Hold the hinge in place and loosely secure with the two mounting screws but do not tighten the screws down yet (Figure 83).
2. Holding the door firmly, align the pins in the upper halves of both door hinges with the holes in the lower halves, and gently lower the door onto the hinges (Figure 82).
3. Gently swing the door open and closed several times to make sure it moves freely. This insures that the upper and lower hinges align with each other.
4. Tighten the hinge mounting screws.
5. Close and latch the door.

Door Gasket

P/N 754455

The gasket on each animal compartment door consists of four parts, cut to length, and bonded to the inside of the door frame. The gaskets on the two doors are identical and are removed and installed the same way. If necessary, you can replace only those gasket segments that are damaged; it may not be necessary to replace all four segments.

Tools and Supplies Required

- Utility knife
- Razor blade
- Tape measure

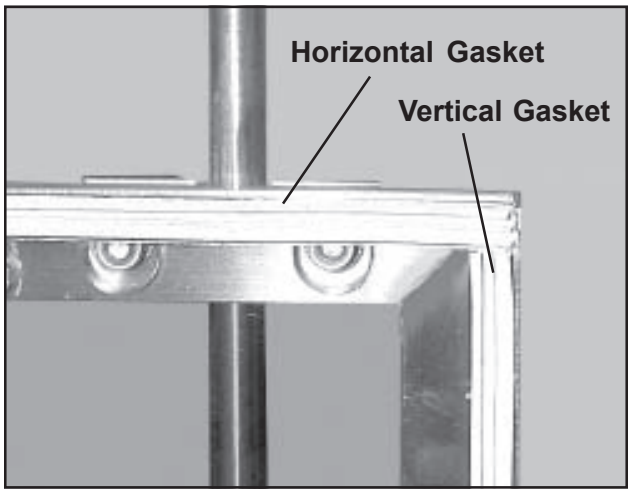

Figure 84. Animal Compartment Door Gasket

Removal

1. Open the door.
2. Lift the complete door up until the upper halves of both door hinges come free of the lower halves (Figure 82).
3. Lay the door latch-side down, on a soft surface where you can work on it without scratching the acrylic.
4. With a utility knife, peel the old gasket off the door (Figure 84).
5. With a razor blade, make sure the surface from which the gasket was removed is clean and free of old adhesive.

Installation

1. Measure and cut a piece of gasket material equal in length to the piece being replaced.
2. Peel the protective backing from the new gasket material.
3. Press the new gasket in place on the door.
4. Holding the door firmly, align the pins in the upper halves of both door hinges with the holes in the lower halves, and gently lower the door onto the hinges (Figure 82).
5. Close and latch the door.

Latch Connector Rest

P/N 618472

There is a latch connector rest on each animal compartment door. The rests are identical and are removed and installed the same way. The rests can be replaced without removing the doors from the unit.

Tools Required

- 11/32-in. wrench
- Flat-blade screwdriver

Procedure

1. Open the door.

2. With a flat-blade screwdriver and a 11/32-in. wrench, remove the two screws/nuts that hold the rest to the door (Figure 85), and remove the rest.

3. Hold the new rest in place and secure with the two screws/nuts. Snug the screws down tightly, but be careful not to crack the clear acrylic panel.

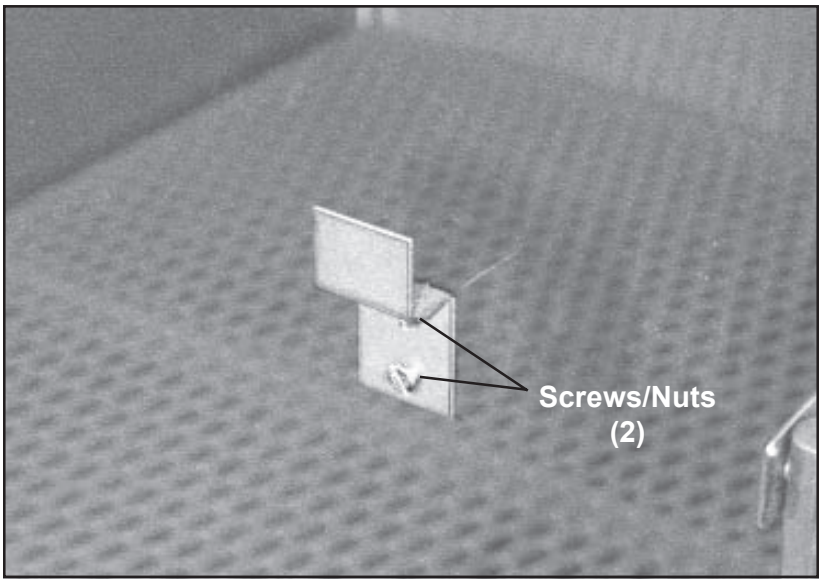

Figure 85. Latch Connector Rest

Latch Connector Holder

P/N 618479

The latch connector holders hold the latch connectors in place on the compartment doors. There is one top and one bottom latch connector holder on each animal compartment door. The four holders are identical and are removed and installed the same way. The holders can be replaced without removing the doors.

Tool Required

- Phillips screwdriver

Removal

1. Open the door.

2. With a Phillips screwdriver, remove the two cap screws that secure the latch connector holder to the unit (Figure 86) and remove the holder from the door.

Installation

1. Hold the latch connector holder in place on the door and secure with the two cap screws. **Note:** The locating pins (Figure 86) in the latch connector should ride above the top latch connector holder, and under the bottom latch connector holder.

2. Close and latch the door.

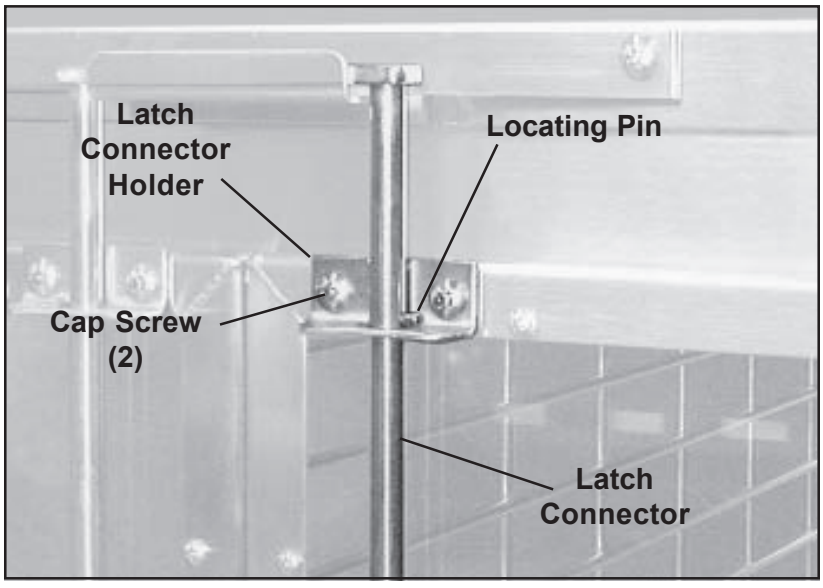

Figure 86. Latch Connector and Holder

Latch Connector

P/N 212047

There is one latch connector on each animal compartment door. The two latch connectors are identical and are removed and installed the same way. The latch connectors can be replaced without removing the doors from the unit.

Tool Required

- Phillips screwdriver

Removal

1. Open the door so that the latch connector is completely dis-engaged from the top and bottom latch brackets.

2. With a Phillips screwdriver, remove the two cap screws that secure the bottom latch connector holder (Figures 86 and 87) and remove the holder from the unit.

3. Remove the two cap screws that secure the top latch connector holder and remove the holder and the latch connector from the door.

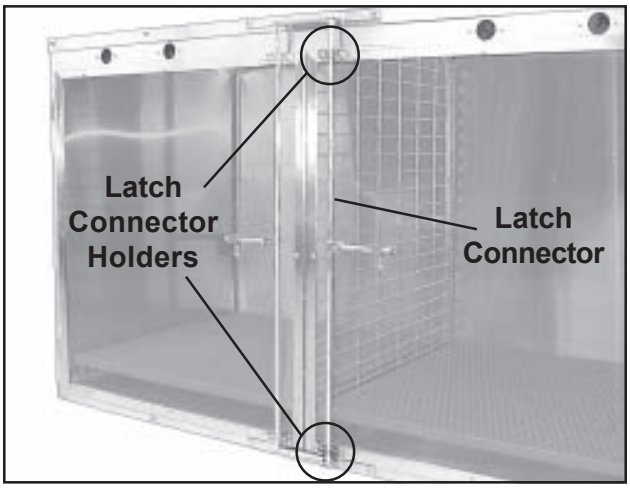

Figure 87. Latch Connector & Holders

Installation

1. Hold the latch connector and the top latch connector holder in place on the door and secure with the two cap screws.
   Note: The locating pins in the latch connector (Figure 86) should ride above the top latch connector holder, and under the bottom latch connector holder.

2. Secure the bottom latch connector in place with the two cap screws.

3. Try closing and latching the door several times to make sure the latch connector operates correctly.

Latch Bracket

Top - P/N 618480
Bottom - P/N 618481

There is one top and one bottom latch bracket on the unit. The two brackets are similar and are removed and installed the same way. The latch brackets can be replaced without removing the doors from the unit.

Tool Required

- Phillips screwdriver

Procedure

1. Open both doors to release the latch connectors from the latch brackets.

2. With a Phillips screwdriver, remove the two cap screws that secure the latch bracket (Figure 88) and remove the bracket from the unit.

2. Hold the latch bracket in place and secure with the two cap screws.

3. Close and lock the door several times to make sure it locks correctly.

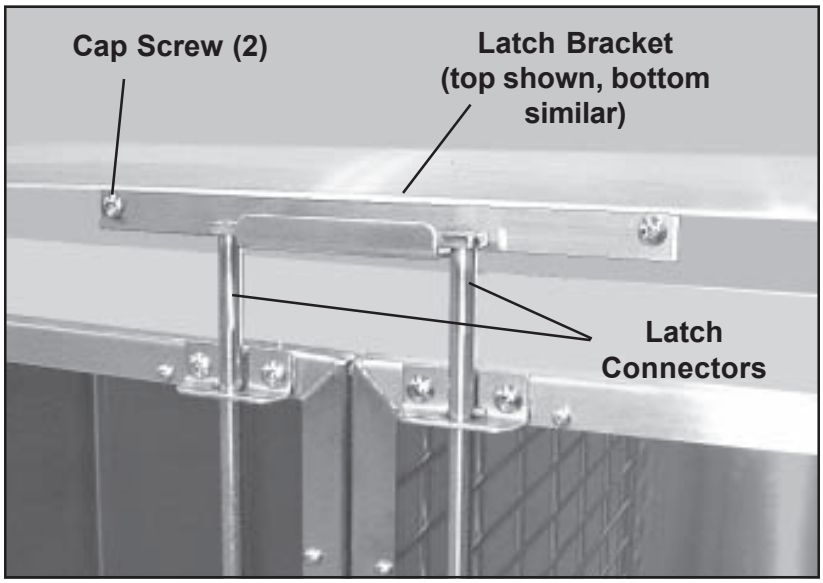

Figure 88. Latch Bracket

Divider Panel

Wire Grill - P/N 206001
Clear Acrylic - P/N 749575

Two divider panels are provided with the Intensive Care Unit. Although different in appearance, they are removed and installed in the same way.

Removal

1. Open both animal compartment doors.

2. Remove the PVC floor (if installed) from the right compartment.

Note: Notice the guide channels for the divider panels in the rear wall and ceiling of the animal compartment (Figure 89).

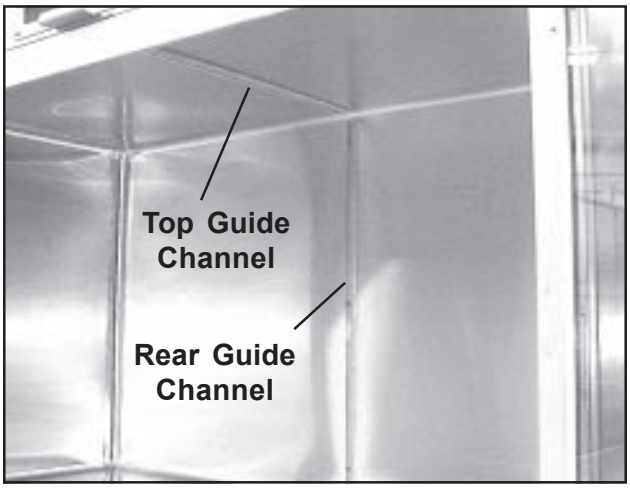

Figure 89. Top and Rear Divider Panel Guide Channels

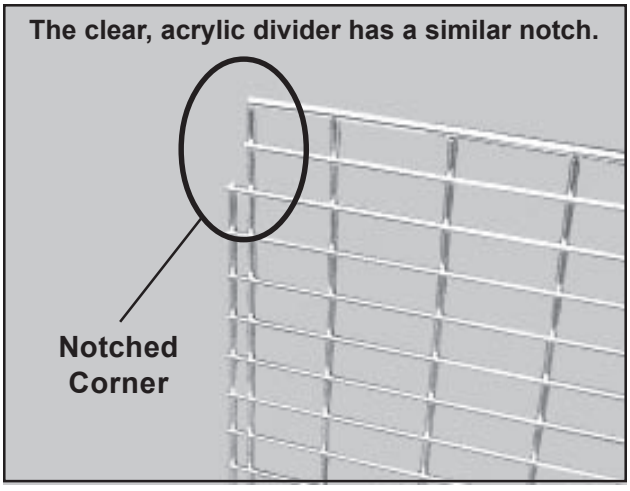

Figure 90. Notched Corner on the Wire Grill Divider Panel.

3. Pull out the divider panel slightly so that it clears the rear channel.

4. Tilt the lower edge of the divider panel to the right until the top edge clears the top guide channel.

5. Remove the divider panel.

Installation

1. Orient the divider panel so that the notched corner is on top and toward the front (Figure 90).

2. Tilt the top of the divider panel to the left, and place it into the top guide channel.

3. Swing the lower edge of the panel to the left so that the panel is vertical.

4. Push the panel to the rear so that the back edge seats in the rear guide channel.

5. Replace the PVC floor, if desired.

6. Close the animal compartment doors.

Seal, IV Port

P/N 752100

There are four IV ports on the Intensive Care Unit; two over each half-size compartment. Each IV port consists of a seal, a seal retainer, two retaining screws, and two locknuts. All four IV port seals are identical and are removed and installed the same way.

Tools Required

- 11/32-in. wrench
- Phillips screwdriver

Removal

1. Open both animal compartment doors.

2. Use a 11/32-in. wrench and a Phillips screwdriver to remove the two cap screws that hold the seal retainer in place (Figure 91) and remove the retainer from the unit.

3. Remove the IV Seal from the unit.

Installation

Note: On the seal and seal retainer, the mounting holes are closer to the top edge than to the bottom edge (Figure 92).

1. Place the IV seal behind the IV port opening with the short side on top.

2. Hold the seal retainer in place, flanges outward, over the seal and secure with the two cap screws and locknuts.

3. Close the doors.

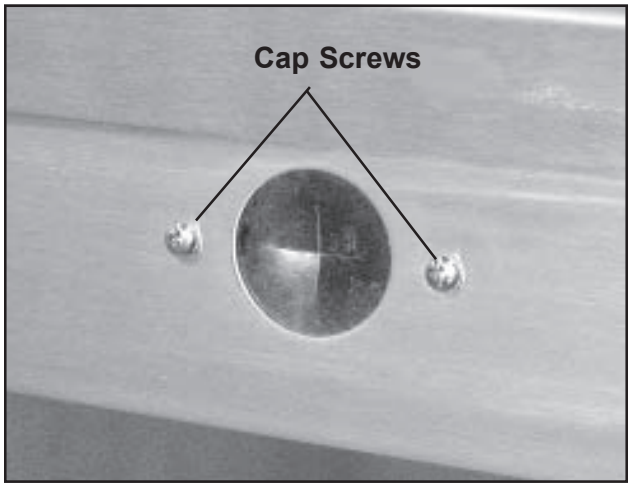

Figure 91. Removing the IV Port

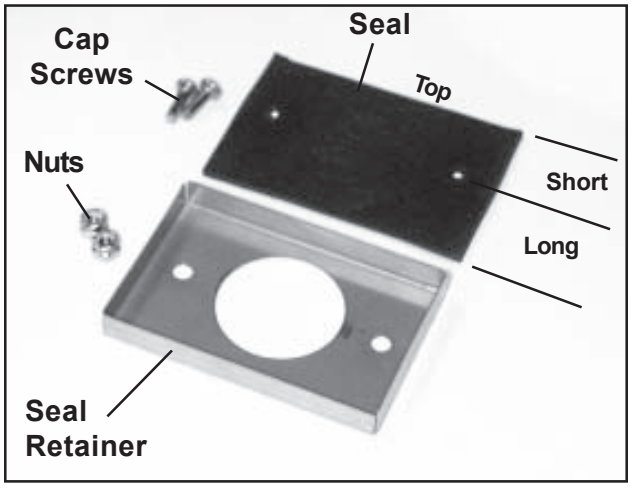

Figure 92. Parts of the IV Port

Electric Power Cord P/N 853431

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.

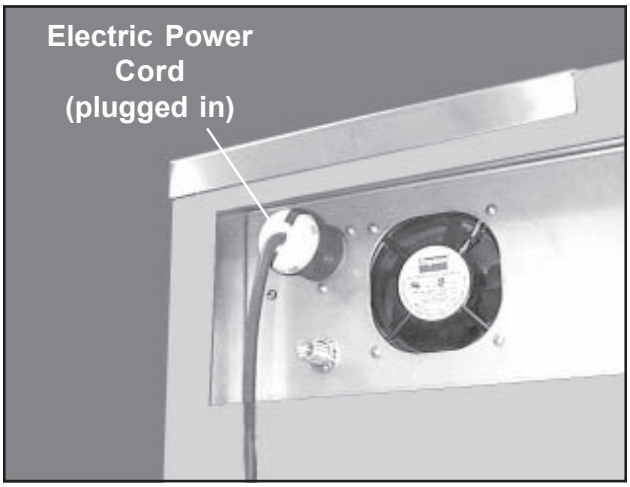

Figure 93. Electrical Connection at Rear of Unit

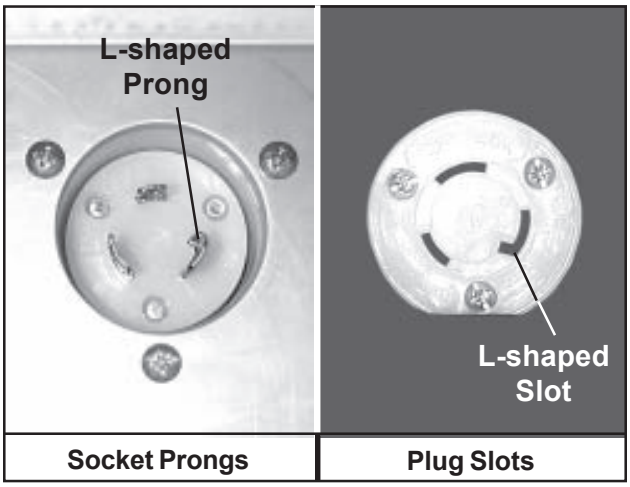

Figure 94. Electrical Connection Plug and Socket

2. Unplug the power cord from the electrical wall outlet.

3. At the power cord connection on the unit, twist the large connector plug counter-clockwise and pull it off (Figure 93).

Installation

Note: Look at the three prongs in the connector socket (Figure 94). Notice that two are curved, and one is curved with an L-shaped tab on one end. Notice also that there are matching slots on the plug.

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1. Align the prongs in the socket with the matching slots on the connector plug.

2. Insert the plug, then twist it clockwise to lock it (Figure 94).

3. Plug the other end of the power cord into its wall outlet.

Removable PCV Floor

P/N 102275-00

Two orange, removable PCV floors are provided with the Intensive Care Unit. The floors are identical and are removed and installed the same way.

CAUTION: **The removable floors can be badly stained with animal solids and fluids. Use protective gloves when handling the floors if they are dirty.**

CAUTION: **When removing the PCV Floor from the unit, protect yourself, the room floor, and surrounding objects from any dripping animal solids and fluids that may be on the PCV Floor.**

Procedure

1. Open the animal compartment doors.
2. Grasp the front edge of the PVC floor, and pull it out of the unit.
3. Slide the new PCV floor into the floor of the animal compartment.
4. Close and latch the doors.

Fuel Cell

P/N 853396

The fuel cell powers the black calibration needle in the oxygen concentration meter. The cell has an average life of about one year, depending on frequency of use. Difficulty in moving the black calibration needle in the oxygen concentration meter is usually an indication of an exhausted fuel cell.

CAUTION: **Do not remove the fuel cell from the bag until ready to use.**

CAUTION: **Wear safety glasses when handling the fuel cell.**

CAUTION: **Avoid contact with the sensing surface.**

CAUTION: **The fuel cell contains lead, a chemical known to cause cancer, birth defects, or other reproductive harm.**

CAUTION: **Wash your hands thoroughly after handling the fuel cell.**

1. Open the brown box, then open the plastic bag inside and take out the fuel cell.

2. Open the electronics compartment (refer to *Page 57*).

3. Open the filter/fans compartment (refer to *Page 58*).

4. Inside the filter/fans compartment, notice the installation of the oxygen sensor (Figure 97).

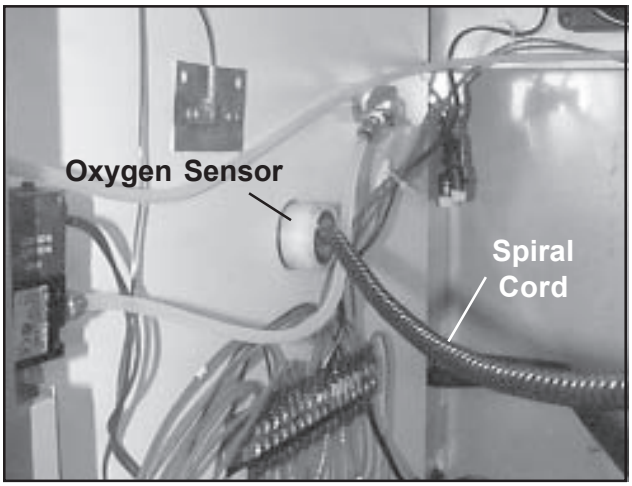

Figure 95. Oxygen Sensor Inside the Electronics Compartment

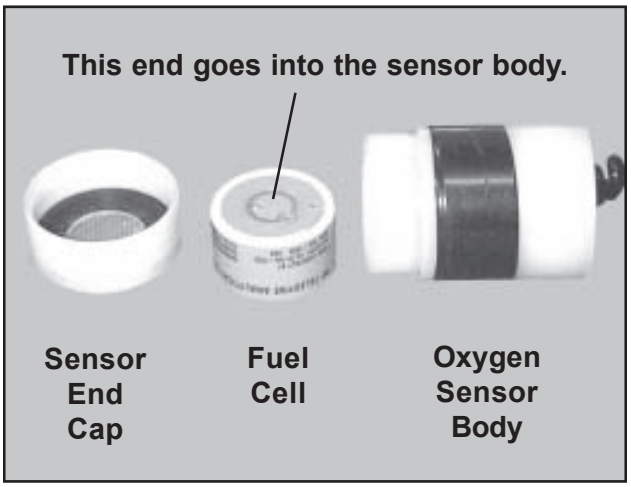

Figure 96. Fuel Cell and Oxygen Sensor Assembly

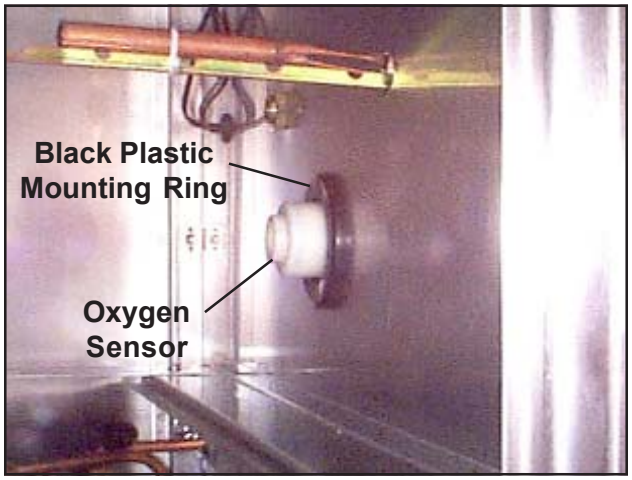

Figure 97. New Style Oxygen Sensor Mount

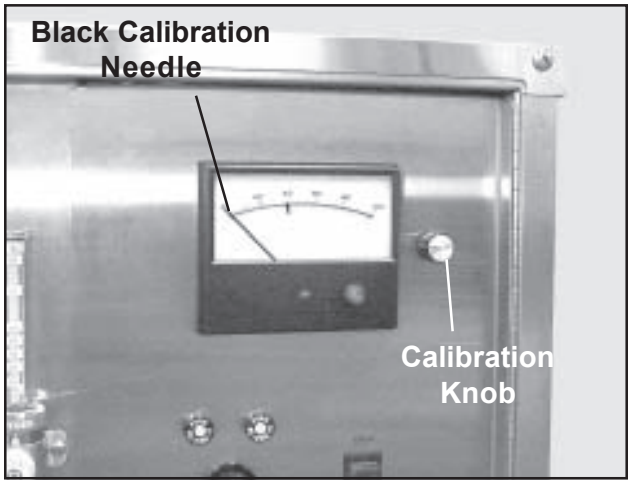

Figure 98. Oxygen Concentration Meter and Calibration Knob

- If the oxygen sensor is mounted in the large black plastic ring, you have a New Style Intensive Care Unit (produced after January 1, 2005). Proceed to ***New Style Units*** on *Page 87*.

- If this large black ring is not present, you have an Original Style Intensive Care Unit (produced before January 1, 2005). Follow the instructions under ***Original Style Units*** below.

Original Style Units:

1. In the electronics compartment (Figure 95) twist the sensor slightly, and pull it out of the compartment wall. **Note:** Do not try to detach the spiral cord from the sensor.

96

2. Unscrew the end cap from the oxygen sensor (Figure 38).

3. Remove and discard the old fuel cell.

Dispose of used fuel cells in accordance with local, state, and Federal regulations.

4. On the new fuel cell, remove the shorting button - refer to the instructions packed with the fuel cell.

Note: Watch the oxygen concentration meter (Figure 98) as you perform *Step 5*. The black calibration needle moves to the right, then settles down.

5. Place the fuel cell into the oxygen sensor body. The end of the fuel cell with the metal disk goes in first.

6. Gently, screw the sensor end cap back on. Be careful, the threads are very fine and are easily damaged.

7. Re-insert the oxygen sensor into the wall.

8. Proceed to *Finish the Installation* on *Page 87*.

New Style Units

1. Do not remove the oxygen sensor from the partiion wall.

2. With the oxygen sensor in place in the partition wall, unscrew the end cap from the oxygen sensor (Figure 96).

3. On the fuel cell, remove the shorting button - refer to the instructions packed with the fuel cell.

Note: Watch the oxygen concentration meter (Figure 38) as you perform *Step 4*. The black calibration needle moves to the right, then settles down.

4. Place the fuel cell into the oxygen sensor body. The end of the fuel cell with the metal disk goes in first.

5. Gently, screw the sensor end cap (Figure 96) back on. Be careful, the threads are very fine and are easily damaged.

6. Proceed to *Finish the Installation* below.

Finish the Installation

1. Close and secure the electronics compartment door.

2. Close and secure the filter/fans compartment.

3. Using the calibration knob (Figure 98), position the black needle in the oxygen concentration meter to 20.5% (the percentage of oxygen in atmospheric air).

4. When you are finished working with the fuel cell, wash your hands thoroughly.

Oxygen Sensor

P/N 853395

The oxygen sensor is connected, via a spiral cord, to the rear of the oxygen concentration meter.

1. Open the electronics compartment (refer to *Page 57*).

2. Open the filter/fans compartment (refer to *Page 58*).

3. Inside the filter/fans compartment, notice the installation of the oxygen sensor (Figure 99).

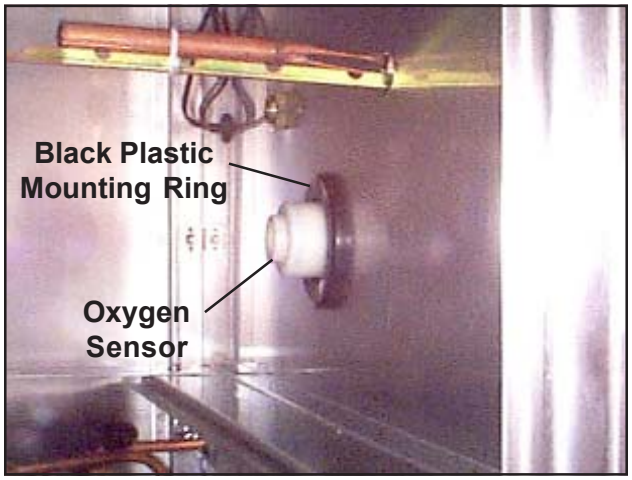

Figure 99. New Style Oxygen Sensor Mount

- If the oxygen sensor is mounted in the large black plastic ring, you have a New Style Intensive Care Unit (produced after January 1, 2005). Proceed to ***New Style Units*** on *Page 90.*

- If this large black ring is not present, you have an Original Style Intensive Care Unit (produced before January 1, 2005). Follow the instructions under ***Original Style Units*** below.

Original Style Units

Tools and Supplies Required

- Flat-blade screwdriver
- Utility knife or small wire cutter
- Small wire tie

Removal

1. Open the electronics compartment (refer to *Page 57*).

2. The oxygen sensor rests in an opening in the left wall of the electronics compartment (Figure 95). Twist the sensor slightly, and pull it out of the compartment wall. **Note:** Do not try to detach the spiral cord from the sensor.

Note: You can transfer the existing fuel cell to the new oxygen sensor, or install a new one.

CAUTION: **When working with the fuel cell, observe the *CAUTIONS* on *Page 85.***

3. Unscrew the end cap from the oxygen sensor (Figure 96).

4. Remove the fuel cell.

5. Disposition of the fuel cell:
   - If you are transferring the existing fuel cell to the new oxygen sensor, put the cell aside for re-installation.
   - If you are going to use a new fuel cell, discard the old cell.

Dispose of used fuel cells in accordance with local, state, and Federal regulations.

6. Locate the rear of the oxygen concentration meter on the inside of the electronics compartment door (Figure 100).

Note: Terminal numbers are displayed on the rear of the meter by molded-on, raised numbers. Also, a label showing terminal numbers is affixed to the top of the body of the meter.

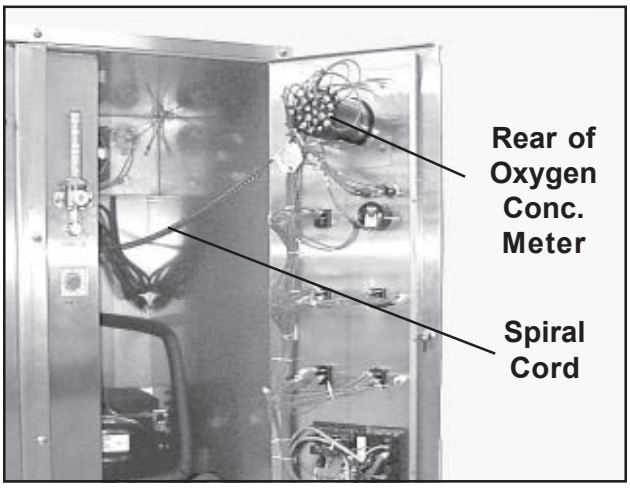

Figure 100. Inside of Electronics Compartment Door

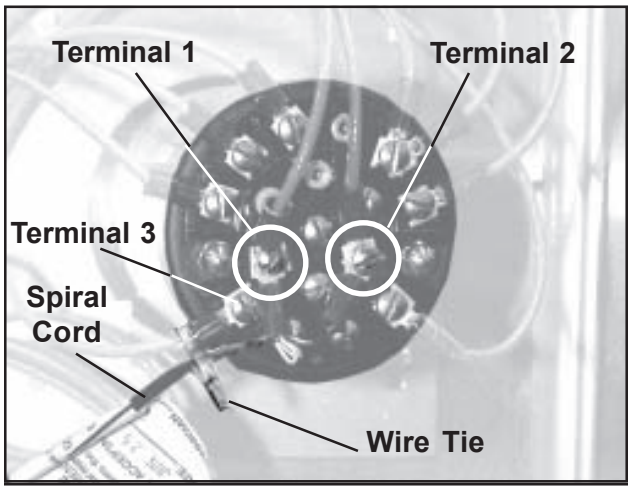

Figure 101. Oxygen Sensor Wire Connections on the Rear of the Oxygen Concentration Meter

7. Cut and remove the wire tie holding the wires from the spiral cord to the wire on Terminal **3** (Figure 101).

8. With a flat-blade screwdriver, disconnect the two white wires from the spiral cord to Terminal **1** on the back of the meter. Do not disturb the other wire on the terminal.

9. Disconnect the white and black wires from the spiral cord to Terminal **2**. Do not disturb the other wire on the terminal.

10. Remove and discard the old oxygen sensor and spiral cord.

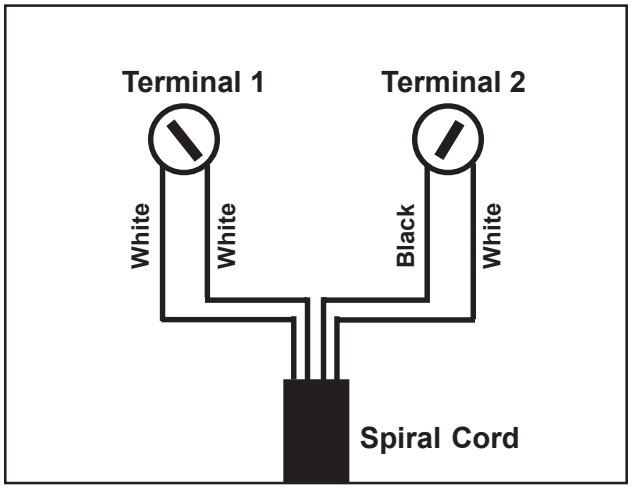

Figure 102. Wiring Diagram of Oxygen Sensor-to-Meter Connections

Installation

1. Connect the white and black wires from the spiral cord of the new oxygen sensor to Terminal **2** on the meter (Figure 102).

2. Connect the two white wires from the new spiral cord to Terminal **1** on the meter.

3. With a new wire tie, secure the wire from the spiral cord to the same wire on Terminal **3**.

4. If you are using a new fuel cell, remove the dark red shorting button (refer to the instructions packed with the fuel cell).

Note: Watch the oxygen concentration meter as you perform *Step 5*. The calibration needle moves to the right, then settles down.

5. Place the fuel cell into the oxygen sensor. The end of the fuel cell with the metal disk goes in first.

6. Gently, screw the sensor end cap back on. Be careful, the threads are very fine and are easily damaged.

7. Insert the oxygen sensor/fuel cell into the wall.

8. Close and secure the electronics compartment door.

9. Using the calibration knob, position the calibration needle in the oxygen concentration meter to 20.5%.

10. When you are finished working with the fuel cell, wash your hands thoroughly.

New Style Units

Removal

1. Open the electronics compartment (refer to *Page 57*).

2. Open the filter/fans compartment (refer to *Page 58*).

3. In the filter/fans compartment, pull the oxygen sensor out of the large black plastic mounting ring.

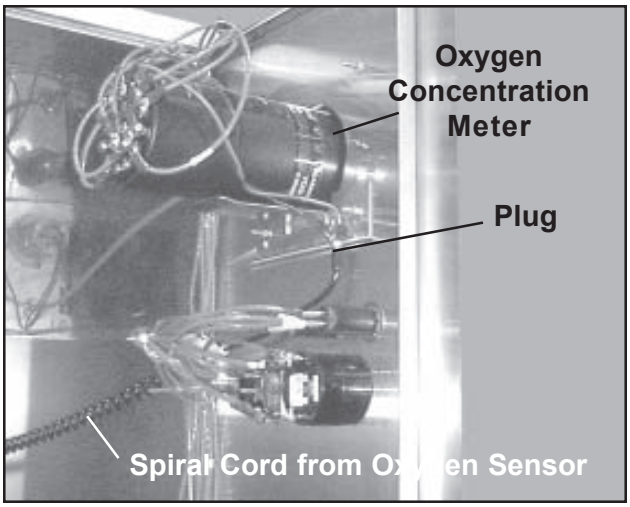

Figure 103. Oxygen Sensor Spiral Cord and Plug

4. Unplug the spiral cord from the oxygen concentration meter (Figure 103).

5. Remove the complete oxygen sensor assembly from the unit.

CAUTION:* When working with the fuel cell, observe the *CAUTIONS* on *Page 85.

6. Unscrew the end cap from the oxygen sensor (Figure 96).

7. Remove the fuel cell.

Note: You can transfer the existing fuel cell to the new oxygen sensor, or install a new one.

Disposition of the fuel cell:

- If you are transferring the existing fuel cell to the new oxygen sensor, put the cell aside for re-installation.
- If you are going to use a new fuel cell, discard the old cell.

Dispose of used fuel cells in accordance with local, state, and Federal regulations.

Installation

1. If you are using a new fuel cell, remove the dark red shorting button (refer to the instructions packed with the fuel cell).

Note: Watch the oxygen concentration meter as you perform *Step 2*. The calibration needle moves to the right, then settles down.

2. Place the fuel cell into the oxygen sensor. The end of the fuel cell with the metal disk goes in first.

3. Gently, screw the sensor end cap back on. Be careful, the threads are very fine and are easily damaged.

4. From the filter/fans compartment, string the oxygen sensor spiral cord through the hole in the large, black mounting ring, into the electronic compartment, and plug it into the oxygen concentration meter (Figure 103).

5. Insert the oxygen sensor/fuel cell into the wall.

6. Close and secure the electronics compartment door.

7. Close and secure the filter/fans compartment.

8. Using the calibration knob, position the calibration needle in the oxygen concentration meter to 20.5%.

9. When you are finished working with the fuel cell, wash your hands thoroughly.

Oxygen Concentration Meter

P/N 853436

The oxygen concentration meter is mounted in the electronics compartment door.

CAUTION: **Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

Tools and Supplies Required

- Flat-blade screwdriver
- 1/4-in. wrench
- Utility knife or small wire cutter
- Small wire tie
- Markers, masking tape, tags, or other means to mark wires

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.

2. Unplug the power cord from the electrical outlet.

3. Open the electronics compartment (refer to *Page 57*).

Note: Check Figure 103. If the spiral cord is attached to meter with the plug shown, unplug the cord. The meter wires will not be connected to the meter as shown in Figure 101.

4. Identify the oxygen concentration meter, and remove the oxygen sensor wires - refer to *Oxygen Sensor - Removal - Steps 7* through *9,* starting on *Page 89*.

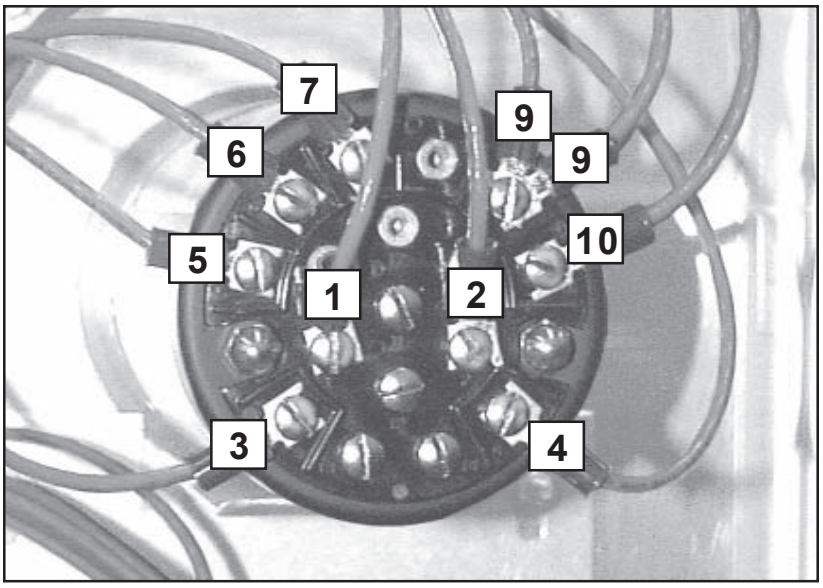

Figure 104. Oxygen Concentration Meter Wire Connections

Note: Terminal numbers are displayed on the rear of the meter by molded-on, raised numbers. Also, a label showing terminal numbers is affixed to the top of the body of the meter.

5. Using tags, masking tape, or any other convenient means, tag each of the remaining ten wires on the meter with the terminal numbers to which they are connected (Figure 104). Notice that there are *two* wires on Terminal **9**. Failure to mark the wires will make it difficult to connect them correctly later.

6. Dis-connect all wires from the oxygen concentration meter.

7. With a 1/4-in. wrench, remove the nuts from the two lower meter mounting studs (Figure 105).

8. Remove the washers and the meter bracket from the door.

9. Remove the nuts from the two upper meter mounting studs. **Note:** The upper nuts do not have washers.

10. Pull the complete meter assembly out of the front of the door.

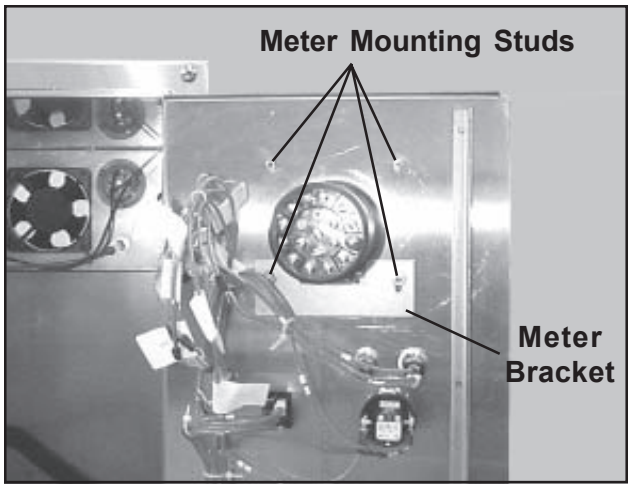

Figure 105. Meter Mounting Studs

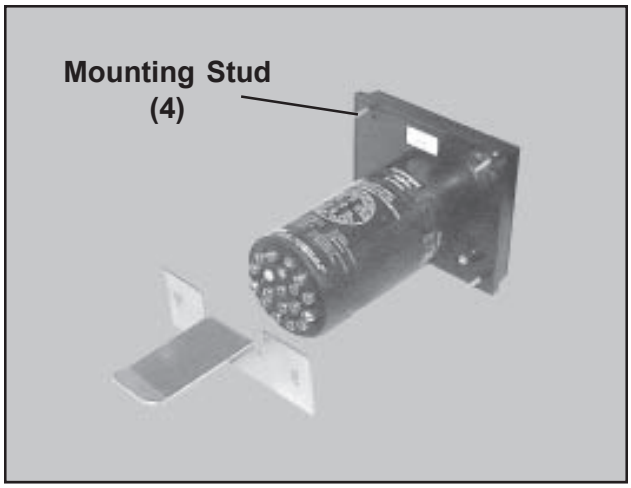

Figure 106. Oxygen Concentration Meter and Bracket

Installation

1. Put the new meter into its mounting hole in the door so that the four mounting studs pass through their holes (Figure 106).

2. Place two of the nuts removed earlier onto the upper mounting studs and tighten securely.

3. Place the meter bracket on the two lower mounting studs and secure with two nuts/washers removed earlier (refer to Figure 106 for correct orientation of the bracket).

4. Re-connect all ten wires to the oxygen concentration meter (Figure 104). Double-check all connections for tightness and correct terminations.

Note: Plug the spiral cord into the meter, if the plug is present as shown in Figure 103.

5. Re-connect the oxygen sensor wires - refer to *Oxygen Sensor - Installation - Steps 1* through *3,* on *Page 90.*

6. Close and secure the electronics compartment door.

7. Using the calibration knob position the calibration needle in the oxygen concentration meter to 20.5%.

8. Plug the power cord into its wall outlet.

Knob

P/N 853461

Three knobs are used on the electronics compartment door. One is on the oxygen concentration meter calibration potentiometer, and the others are the left and right floor temperature controller knobs. The knobs are identical and are removed and installed the same way.

Tool Required

- Small flat-blade screwdriver

Procedure

1. Take note of the position of the indicator line on the knob (Figure 107).
2. With a small flat-blade screwdriver, loosen the lock screw on the side of the knob.
3. Pull the knob off the shaft.
4. Press the new knob onto the shaft with the indicator line in approximately the same position as on the old knob.
5. Tighten the lock screw.

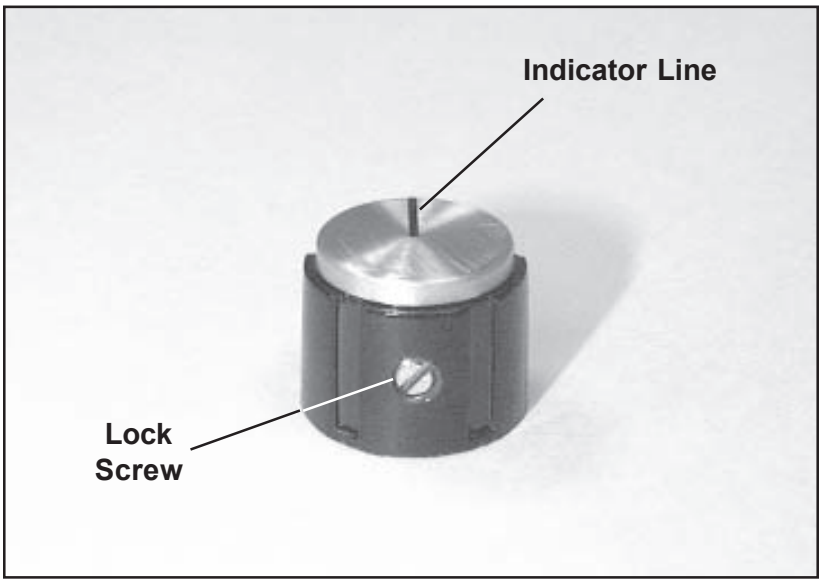

Figure 107. Knob and Lock Screw

Potentiometer, Calibration

P/N 853397

The potentiometer operates the calibration needle in the oxygen concentration meter, and is located behind the calibration knob.

CAUTION: **Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

Tools and Supplies Required

- Flat-blade screwdriver
- Small flat-blade screwdriver
- 1/2-in. wrench
- Utility knife or small wire cutter
- Small wire tie

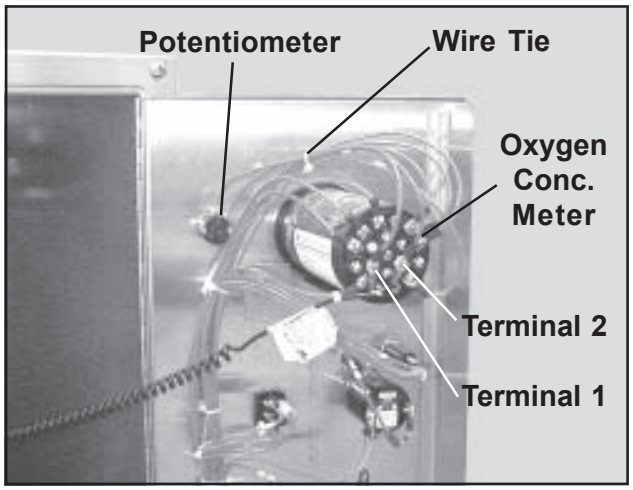

Figure 108. Rear View of Calibration Potentiometer

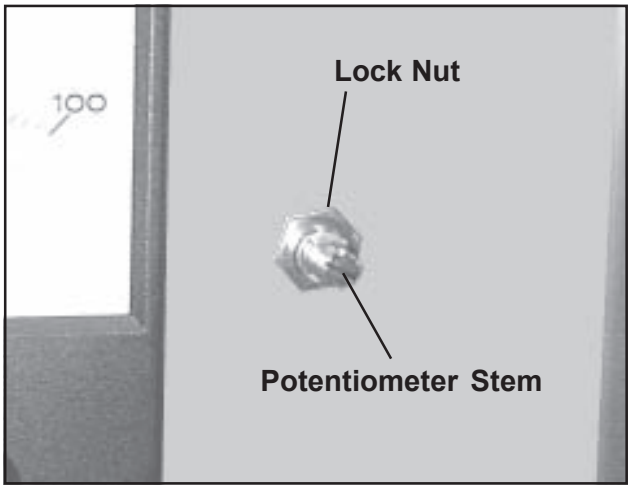

Figure 109. Calibration Potentiometer Lock Nut (Knob Removed)

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.

2. Unplug the power cord from the electrical outlet.

3. Open the electronics compartment (refer to *Page 57*).

Note: Terminal numbers are displayed on the rear of the oxygen concentration meter by molded-on, raised numbers. Also, a label showing terminal numbers is affixed to the top of the body of the meter.

4. Two wires lead from the potentiometer to Terminals **1** and **2** on the oxygen concentration meter (Figure 108). Dis-connect both wires from the meter. Do not disturb the other wires on the terminals.

5. Cut and remove the wire tie holding the two wires to the wire bundle going to the meter.

6. With a small flat-blade screwdriver, loosen the lock screw on the side of the knob (Figure 107).

7. Pull the knob off the shaft.

8. With a 1/2-in. wrench, remove the lock nut behind the knob (Figure 109).

9. Pull out the old potentiometer and attached wires.

Installation

1. Place the new potentiometer into the electronics compartment door from the rear. **Note:** Make sure that the three terminals on the rear of the potentiometer are on top (Figure 110).

2. Secure the potentiometer with the lock nut (Figure 109).

3. Replace the knob and tighten the lock screw.

Note: The three soldered wire terminals on the potentiometer are shown in Figure 110:

- Center terminal - wire goes to Terminal **1** on meter
- Front terminal - wire goes to Terminal **2** on meter
- Rear terminal - not used

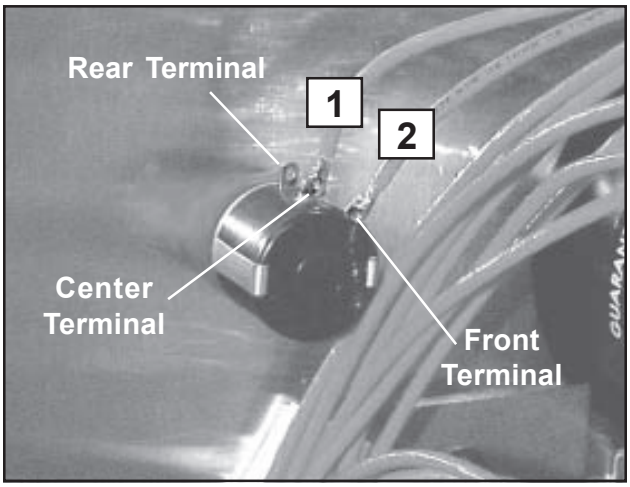

Figure 110. Wire Terminals on the Rear of the Potentiometer

4. Connect the wire from the center terminal to Terminal **1** on the meter.

5. Connect the wire from the front terminal to Terminal **2** on the meter.

6. Replace the wire tie you removed earlier.

7. Observe the meter while you turn the calibration knob. The calibration needle should move in response to the knob.

8. Close and secure the electronics compartment door.

9. Using the calibration knob, position the calibration needle in the oxygen concentration meter to 20.5%.

10. Plug the power cord into its wall outlet.

Circuit Breaker

P/N 853466

Two identical 10 amp. circuit breakers are located on the electronics compartment door. The left breaker (viewed from the front) protects the cooling system. The right breaker protects the remainder of the unit. Both circuit breakers are removed and installed the same way.

***CAUTION:* Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

Tool Required

- Small flat-blade screwdriver

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.
2. Unplug the power cord from the electrical outlet.
3. Open the electronics compartment (refer to *Page 57*).
4. Pull the two spade connectors off the rear of the circuit breaker (Figure 111). **Note:** The breaker for the cooling system has three wires; the other breaker has only two.

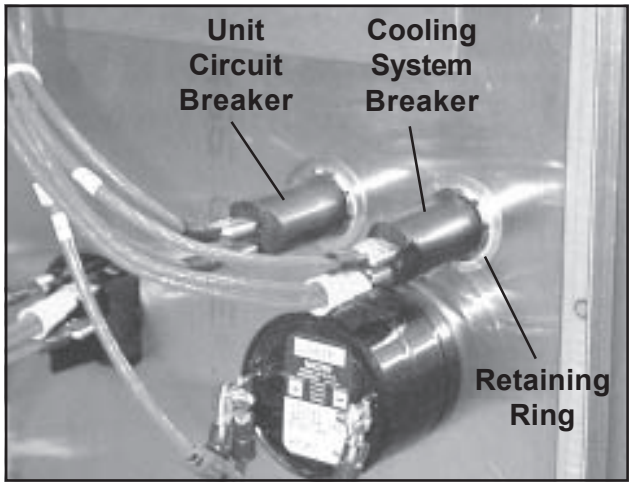

Figure 111. Rear View of Circuit Breakers

5. With a small flat-blade screwdriver, pry the retaining ring from the circuit breaker.
6. Pull the circuit breaker out through the front of the door.

Installation

1. Slide the new circuit breaker into the door from the front.
2. Place the new retaining ring (supplied) onto the rear of the breaker and push it all the way to the front to hold the breaker firmly in place.

3. Replace the wire spade connectors on the circuit breaker terminals. **Note:** Either wire can go on either terminal.

4. Close and secure the electronics compartment door.

5. Plug the power cord into its wall outlet.

On/Off Rocker Switch (Main, Alarm, Oxygen, Cooling & Heat)

P/N 853422

There are five on/off rocker switches on the electronics compartment door. There is one switch each for the main, alarm, oxygen, cooling, and heat functions. All switches are identical and are removed and installed the same way. (For left and right floor temperature on/off buttons, refer to *Page 104*.)

CAUTION: **Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

Tool and Supplies Required

- Flat-blade screwdriver
- Markers, masking tape, tags, or other means to mark wires

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.

2. Unplug the power cord from the electrical outlet.

3. Open the electronics compartment (refer to *Page 57*).

Note: Though all five switches are identical, they are wired differently. Mark all wires or wire groups on the switch you are replacing to permit correct termination later. In some cases, more than one wire is connected to a single spade connector.

4. Using tags, masking tape, or any other convenient means, tag all of the spade connectors on the switch with their positions on the switch (upper right, lower left, etc.) Terminal numbers are displayed on the rear of the switch (Figure 113) by molded-on, raised numbers, but they are very tiny and can be hard to read. Failure to mark the wires will make it difficult to connect them correctly later.

5. Pull all the wire spade connectors off the rear of the switch (Figure 112).

6. The switch is held into the door by four, thin, curved, plastic retaining tabs, two on top the switch, and two below. Squeeze all four tabs down and push the switch out through the front of the door.

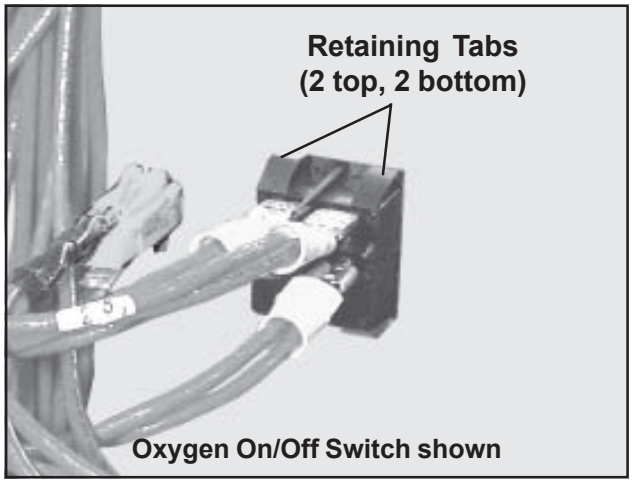

Figure 112. Inside View - Typical On/Off Rocker Switch

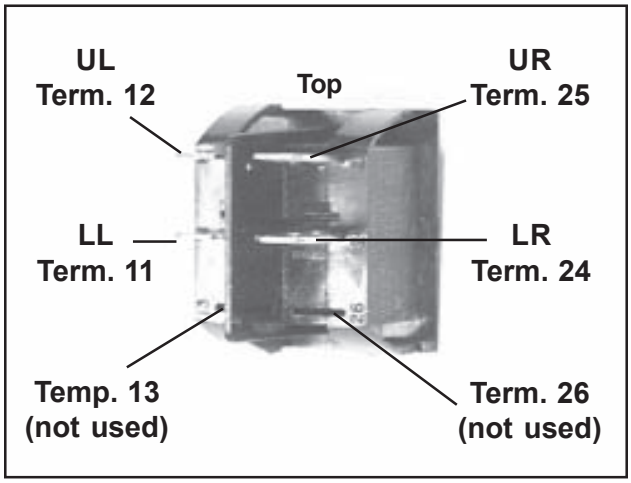

Figure 113. Rear View of On/Off Rocker Switch

Installation

1. Examine the rear of the switch and locate Terminals **12** and **25** (Figure 113). The switch must be installed with these terminals on top.

2. Check the front of the switch. Make sure that the lower part of the switch is depressed (Off position).

3. With Terminals **12** and **25** on top, insert the switch into its opening from the front until it snaps into place.

4. Replace the wire spade connectors on the switch terminals.

5. Close and secure the electronics compartment door.

6. Plug the power cord into its wall outlet.

On/Off Button (Floor Temperature, Left & Right)

P/N 212242

There are two on/off buttons on the electronics compartment door: one each for left and right floor temperature. The buttons are identical and are removed and installed the same way. (For main, alarm, oxygen, cooling and heat on/off rocker switches, refer to *Page 99*.)

CAUTION: **Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

Tools and Supplies Required

- Flat-blade screwdriver
- Wire crimping tool
- Small spade terminal (refer to text, *Removal - Step 8*)
- Utility knife

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.

2. Unplug the power cord from the electrical outlet.

3. Open the electronics compartment (refer to *Page 57*).

4. Dis-connect the on/off button red wire from the side terminal on the fuse holder (Figure 114).

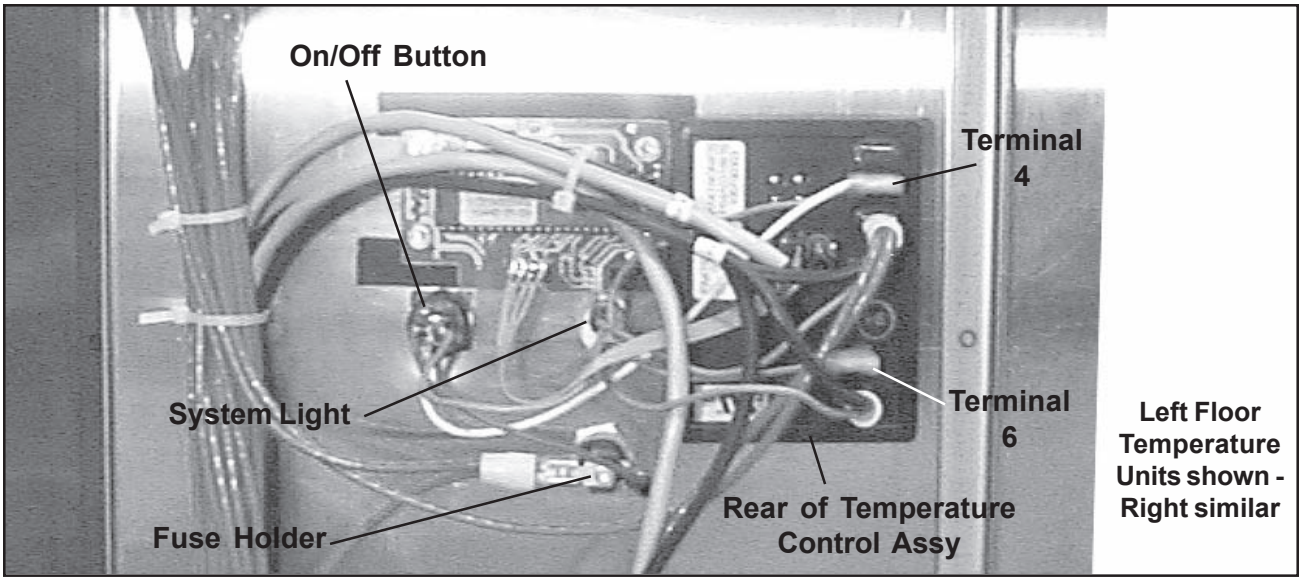

Figure 114. Inside View of Floor Temperature On/Off Button and Related Components

5. Un-plug the green wire from Terminal **6** on the rear of the temperature control assembly.

6. Un-plug the green and white wires from Terminal **4** on the rear of the temperature control assembly.

7. There are two terminals on the rear of the system light. One terminal has two gray wires, the other has only one. Dis-connect the terminal with the two gray wires.

8. Cut both gray wires off the on/off button spade terminal. **Note:** Save the spade connector, and take it to your local hardware or electronics supply store for a replacement.

9. Un-screw and remove the knurled ring from the rear of the on/off button.

10. Pull the button and attached wires out through the front of the compartment door and discard the assembly.

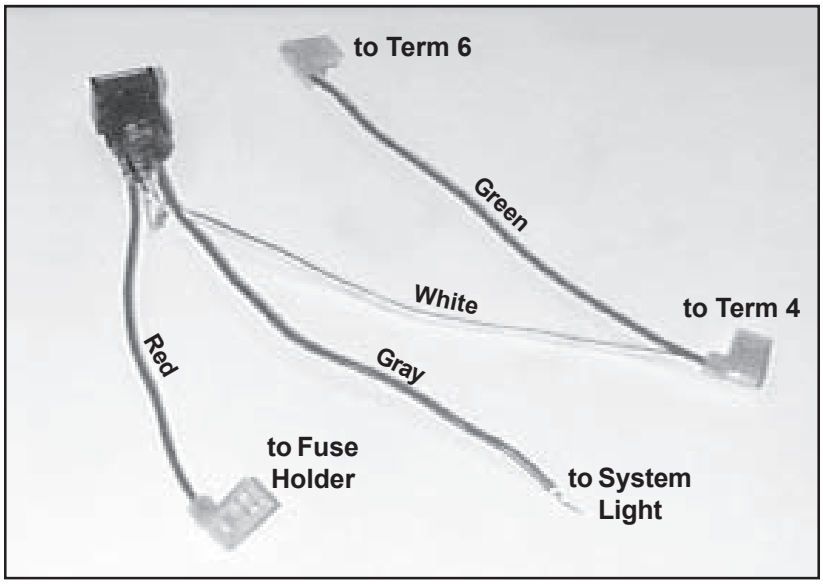

Figure 115. Floor Temperature On/Off Button Replacement Part, P/N 212242

Installation

1. On the new button assembly, unscrew the knurled ring and remove it from the assembly.

2. From the outside of the door, pass the connectors, wires and the button body through the mounting hole.

3. Pass the connectors and wires through the knurled ring and screw the ring firmly onto the button body until holds the button tightly onto the door.

4. Locate the remaining gray wire that you cut off the system light in *Step 8* above.

5. Strip off about 1/2-in. of the insulation from the end of the wire, leaving the bare metal strands exposed.

6. Twist the bare metal strands of this wire together with the strands from the gray wire on the new button assembly.

7. Place a new spade connector onto the two wires and, with a wire crimping took, firmly crimp the connector to the wires. Tug on the connection to make sure it is tight and secure.

8. Connect this spade connector to the rear of the system light (Figures 114 and 115).

9. Plug the connector on the green and white wires onto Terminal **4** on the temperature control assembly.

10. Plug the connector on the green wire onto Terminal **6** on the temperature control assembly.

11. Plug the connector on the red wire to the side terminal on the fuse holder.

12. Close and secure the electronics compartment door.

13. Plug the power cord into its wall outlet.

System Light

P/N 854589

There are six red system lights on the electronics compartment door; one each for alarm, oxygen, cooling, heat, left floor temperature, and light floor temperature. All lights are identical and are removed and installed the same way.

CAUTION: **Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.

2. Unplug the power cord from the electrical outlet.

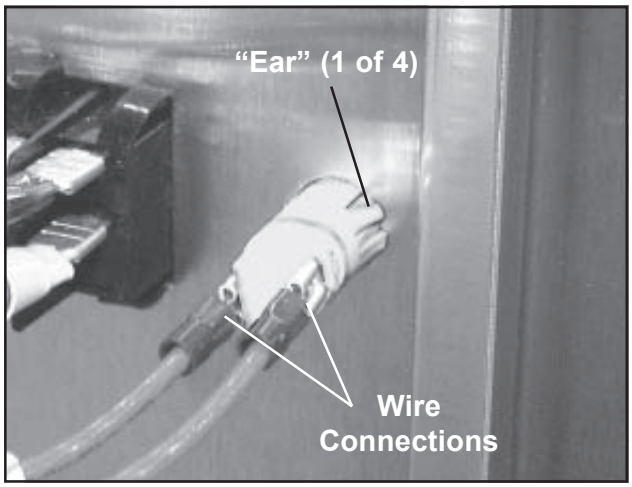

Figure 116. Inside View of System Light

3. Open the electronics compartment (refer to *Page 57*).

4. Pull both wires off of the rear of the light (Figure 116).

5. Squeeze all four "ears" inward, and push the light out through the front of the door.

Installation

1. Push the light body into the door from the front until the "ears" snap into place.

2. Re-place both wires onto the light terminals. Either wire can go to either terminal.

3. Close and secure the electronics compartment door.

4. Plug the power cord into its wall outlet.

Digital Display (Floor Temperature, Left & Right)

P/N 853843

There are two digital displays on the electronics compartment door, one each for left floor temperature and right floor temperature. The displays are identical and are removed and installed the same way.

***CAUTION:* Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

Tool Required

- 13/64-in. wrench

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.
2. Unplug the power cord from the electrical outlet.
3. Open the electronics compartment (refer to *Page 57*).
4. Pull the 4-wire ribbon connector off the rear of the display (Figure 117).
5. With a 13/64-in. wrench, remove the four retaining nuts on the rear of the digital display.

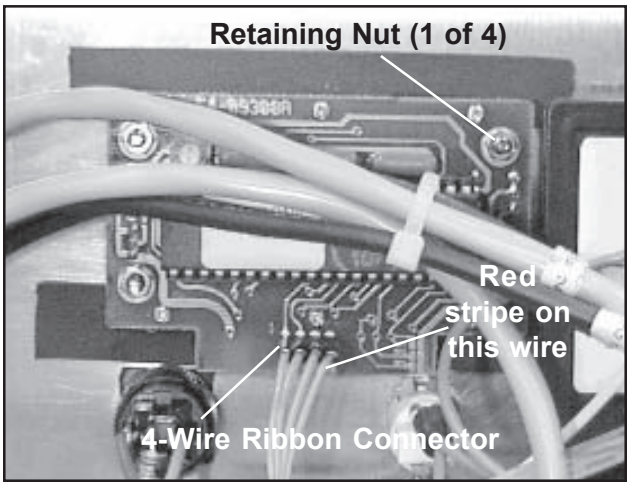

Figure 117. Inside View of Digital Display Assembly

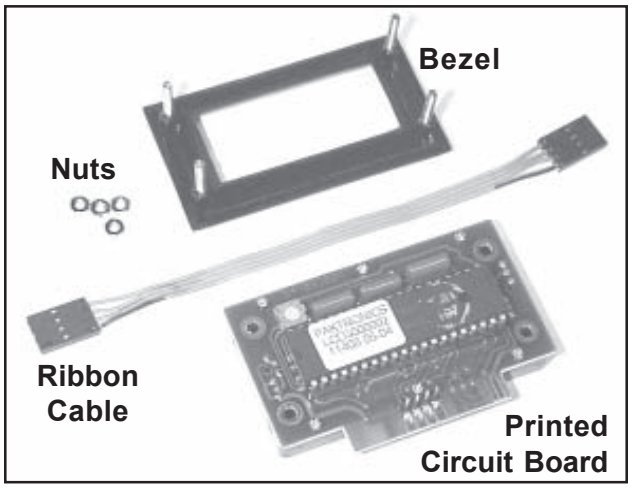

Figure 118. Digital Display Parts

6. Remove the printed circuit board/display assembly from the rear of the unit.

7. Pull the bezel out from the front of the door (Figure 118).

Installation

1. Place the threaded studs on the new bezel into the four screw holes on the front of the door.

2. Inside the door, place the printed circuit board/display assembly over the four studs on the bezel. The extended tab portion of the circuit board should point down. If you install it with the tab pointing up, the display will be upside-down!

3. Secure the assembly together with the four nuts removed above. **Note:** Four spare nuts are provided with the new display. None of the other hardware items supplied in the bag assembly will be needed for this installation.

4. Observe the ribbon cable on the 4-wire connector removed in *Removal - Step 4* above. Note that one wire has red stripes.

5. Connect the 4-wire ribbon connector to the rear of the display. The wire with the red stripe should be to your right. **Note:** A new ribbon cable is supplied with the display. You can use the existing cable, or install the new one.

6. Close and secure the electronics compartment door.

7. Plug the power cord into its wall outlet.

Fuse (Floor Temperature, Left & Right)

P/N 853848

Two fuses are provided for protection of the left and right floor temperature systems (Figure 119). Both fuses are 3AG Fast-Acting, 250 V, 2 amp. If you need replacement fuses you can order them from SSCI, however, they are standard items and can be obtained faster and cheaper at your local hardware or electronics supply store. The fuses are identical and are removed and installed the same way.

CAUTION: **Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

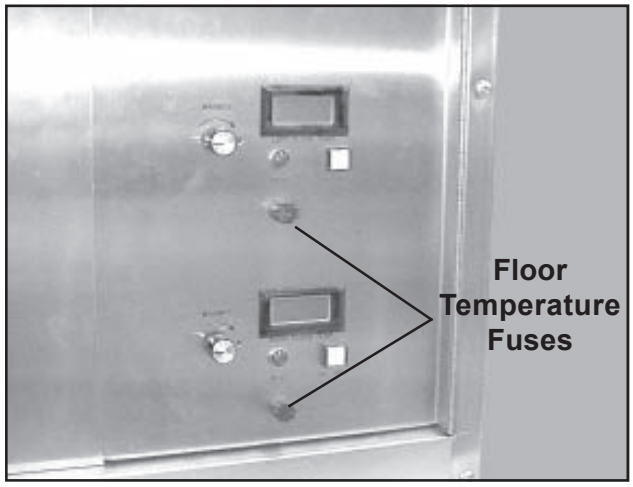

Figure 119. Floor Temperature Fuses

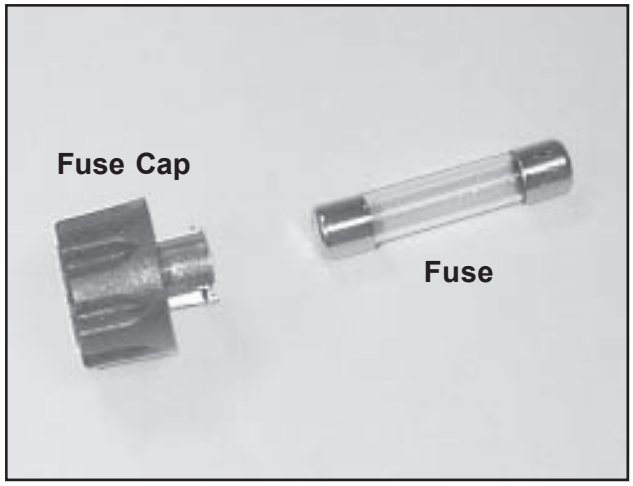

Figure 120. Fuse Cap and Fuse

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.
2. Unplug the power cord from the electrical outlet.
3. Press in on the fuse cap, then twist about one-quarter turn counter-clockwise and pull out the fuse cap and fuse (Figure 120).

Inspection

Inspect the thin, curly metal wire inside the transparent center section of the fuse (Figure 120). If the wire is intact, the fuse is OK. If the wire is burned or broken, the fuse is bad and must be replaced.

Installation

1. Place either end of the fuse into the fuse cap.
2. Engage the "ears" behind the fuse cap into the gaps in the fuse holder.
3. Press in on the fuse cap, and turn about one-quarter turn clockwise until it snaps into place.
4. Plug the power cord into its wall outlet.

Fuse Holder, (Floor Temperature, Left & Right)

P/N 853671

There are two fuse/fuse holder assemblies on the electronics compartment door, one each for left floor temperature and right floor temperature. The fuse holders are identical and are removed and installed the same way.

***CAUTION:* Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

Tool and Supplies Required

- 11/16-in. wrench
- Markers, masking tape, tags, or other means to mark wires

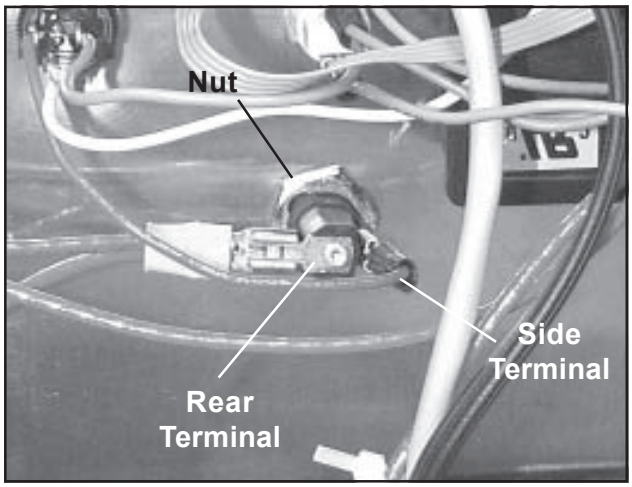

Figure 121. Inside View of Fuse Holder

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.
2. Unplug the power cord from the electrical outlet.
3. Open the electronics compartment (refer to *Page 57*).
4. Mark both wires on the rear of the fuse holder so that you can re-install them correctly.
5. Dis-connect both wires from the fuse holder. **Note:** There are two terminals on the fuse holder: one on the side and one on the rear (Figure 121).
6. With a 11/16-in. wrench, unscrew and remove the nut holding the fuse holder to the door.
7. Pull the fuse holder out through the front of the door.
8. If the fuse is still good, you can remove the it from the fuse holder and re-use it.

Installation

1. Insert the fuse holder through the door from the front.
2. Secure the fuse holder to the door with the nut removed earlier (Figure 121).
3. Re-connect both wires to the terminals on the fuse holder.
4. Close and secure the electronics compartment door.
5. Plug the power cord into its wall outlet.

Floor Temperature Controller (Left & Right)

There are two floor temperature controllers on the electronics compartment door, one each for left floor temperature and right floor temperature. The controllers are identical and are removed and installed the same way.

P/N 853844

***CAUTION:* Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

Tools and Supplies Required

- Small flat-blade screwdriver
- 1/2-in. wrench
- Markers, masking tape, tags, or other means to mark wires

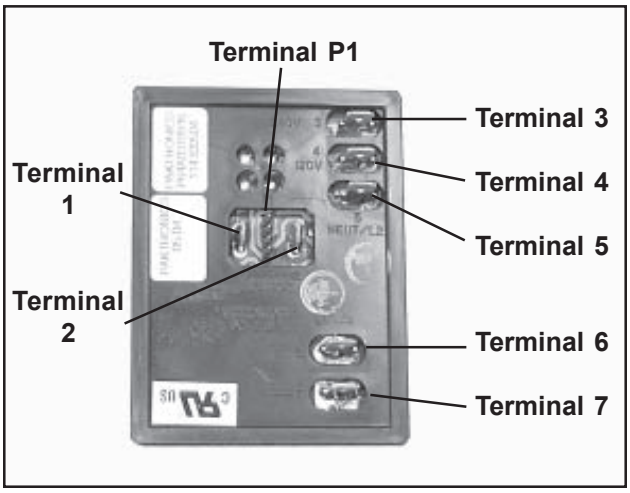

Figure 122. Rear View of Floor Temperature Controller

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.
2. Unplug the power cord from the electrical outlet.
3. Open the electronics compartment (refer to *Page 57*).

Note: Refer to Figure 122 and Table 4 for detailed information on the floor temperature controller wire connections.

Terminal Number	Wire Identification *	Wire Goes to:
3	Vacant - not used	
4	Green	Terminal 6
	White	On/Off Button
5	Red	Terminal 5 on other Temperature Control
	Red	Wire Bundle
6	Green	Terminal 4
7	Large Black	Wire Bundle to Heater
	Gray	System Light
1	Black	Wire Bundle to Sensor
2	Red	Wire Bundle to Sensor
P1	4-wire Ribbon Cable	Digital Display

* Wire colors can vary

Table 4. Wire Terminations - Floor Temperature Controller - Refer to Figure 115 (Same for Left and Right)

4. Using tags, masking tape, or any other convenient means, tag all of the wires on the temperature controller with their terminal numbers. Terminal numbers are displayed on the rear of the control (Figure 122). Failure to mark the wires will make it difficult to re- connect them correctly.

5. Dis-connect the two wires from Terminal **4**.

6. Dis-connect the two wires from Terminal **5**.

7. Dis-connect the single wire from Terminal **6**.

8. Dis-connect the two wires from Terminal **7**.

9. Dis-connect the single wire from Terminal **1**.

10. Dis-connect the single wire from Terminal **2**.

11. Dis-connect the ribbon cable from Terminal **P1**.

12. Close the electronics compartment door.

13. Remove the temperature controller knob. Refer to *Knob - Steps 1* through *3*, on *Page 95*.

14. With a 1/2-in. wrench, remove the nut behind the knob.

15. Remove the nut and internal-star washer from the shaft.

16. Open the electronics compartment door.

17. Pull the complete control assembly out of the door.

Installation

1. From inside the door, place the shaft of the new temperature control through its opening. Make sure it is oriented like the other control assembly.

2. Close the electronics compartment door.

3. Place the internal-star washer on the shaft and secure the assembly in place with the 1/2-in. nut.

4. Turn the shaft fully counter-clockwise.

5. Mount the knob onto the shaft with the indicator line at about the 9:00 position (pointing left), and secure the knob with the lock screw.

6. Open the electronics compartment door.

7. Re-connect the ribbon cable to Terminal **P1**. The wire with the red stripe should be on top.

8. Re-connect the single wire to Terminal **2**.

9. Re-connect the single wire to Terminal **1**.

10. Re-connect the two wires to Terminal **7**.

11. Re-connect the single wire to Terminal **6**.

12. Re-connect the two wires to Terminal **5**.

13. Re-connect the two wires to Terminal **4**.

14. Close and secure the electronics compartment door.

15. Plug the power cord into its wall outlet.

Panel Latch
P/N 853561

There are four latches on the electronics compartment door and one on the filter/fans compartment panel. These five latches are identical and are replaced the same way.

Tool Required

- 11/16-in. wrench

Removal

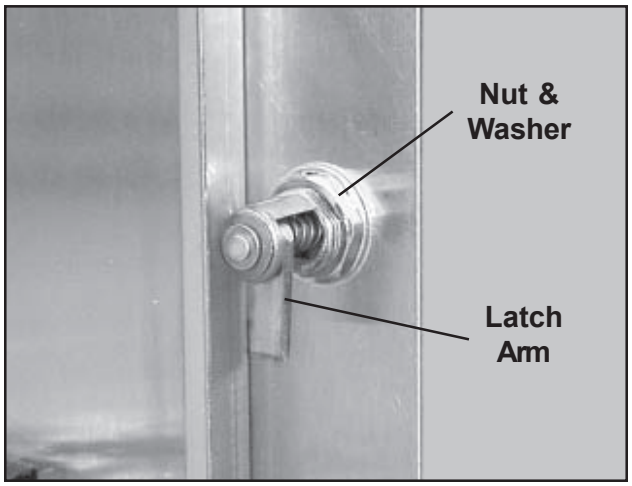

Figure 123. Inside View of Panel Latch

1. Open the electronics compartment (refer to *Page 57*), or the filter/fans compartment (refer to *Page 58*) as appropriate.
2. Before removing the latch, notice the orientation of the latch arm. With the latch in the "open" position, the arm will point either up or down, depending on its location on the door/panel. The new latch should be oriented the same way.
3. With a 11/16-in. wrench, unscrew and remove the nut and washer holding the latch in place (Figure 123).
4. Remove the latch assembly from the front of the door.

Installation

Note: The latch arm rotates through an arc of about 90°. Install the latch so that it opens when rotated counter-clockwise, and locks when rotated clockwise.

1. Make sure the nut and washer are removed from the new latch.
2. From the front of the panel, insert the latch into its opening.
3. Secure the latch in place with the washer and nut and tighten securely.

Thermostat

P/N 853421

***CAUTION:* Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

Tools and Supplies Required

- Phillips screwdriver
- Small flat-blade screwdriver
- 3/8-in. wrench
- 11/32-in. wrench
- Utility knife or small cutter
- Small wire ties (3)
- Markers, masking tape, tags, or other means to mark wires

Removal

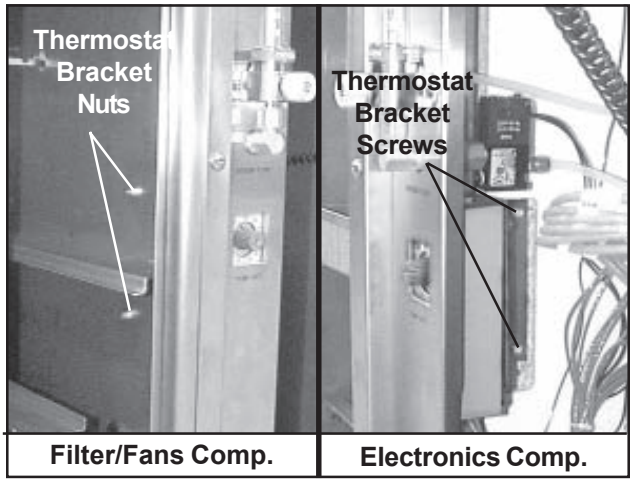

Figure 124. Thermostat Bracket Mounting Screws/Nuts

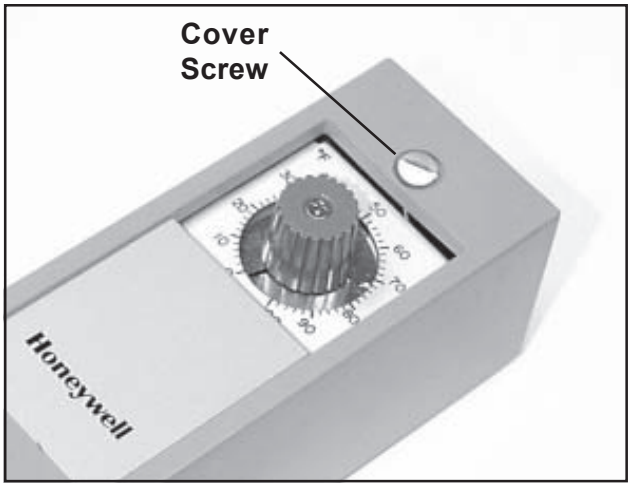

Figure 125. Cover Screw on Thermostat

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.
2. Unplug the power cord from the electrical outlet.
3. Open the electronics compartment (refer to *Page 57*).
4. Open the filter/fans compartment (refer to *Page 58*).

CAUTION:* When handling Sodalime, observe the *CAUTIONS* on *Page 4.

5. Lift out the Sodalime pan and place it in a safe location.
6. With a Phillips screwdriver and a 11/32-in. wrench remove the two screws/nuts that hold the thermostat bracket to the partition wall (Figure 124).
7. Pull the thermostat and bracket out as far as you can.
8. With a small flat-blade screwdriver, remove the cover screw on the front of the thermostat (Figure 125).

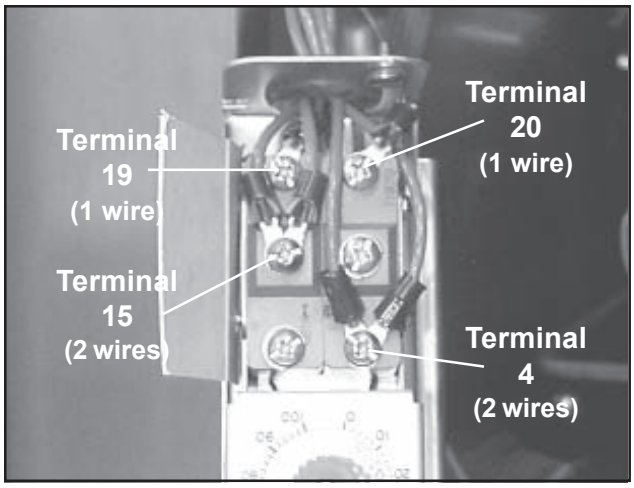

Figure 126. Thermostat Wire Connections

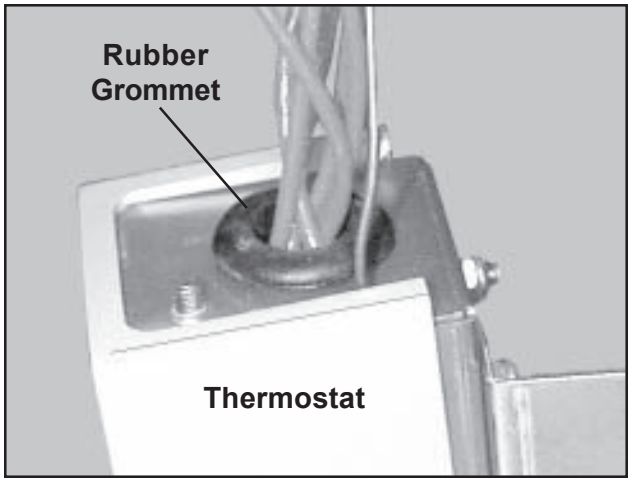

Figure 127. Rubber Grommet

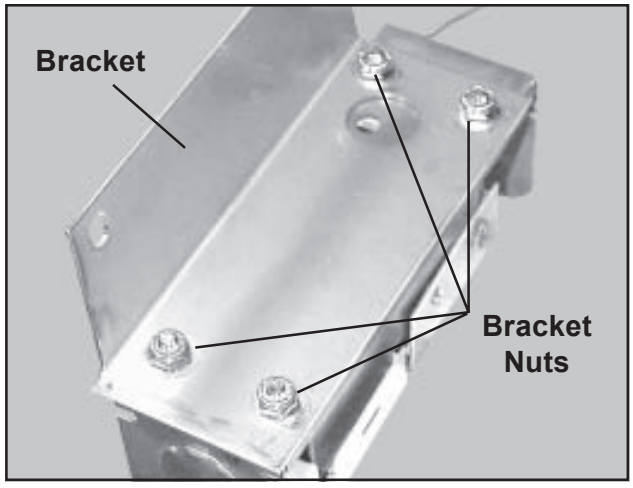

Figure 128. Bracket/Thermostat Nuts

9. Remove the plastic cover from the thermostat.

10. Using tags, masking tape, or any other convenient means, tag each of the six wires on the thermostat by their terminal numbers as shown in Figure 126. Failure to mark the wires will make it difficult to connect them correctly later.

11. With a Phillips screwdriver, dis-connect all six wires, and pull them out of the thermostat.

12. With a small flat-blade screwdriver, pry out the rubber grommet from the hole through which the six wires passed (Figure 127). Save the grommet for re-installation.

13. With a Phillips screwdriver and a 3/8-in. wrench, remove the four screws/nuts that hold the bracket to the thermostat (Figure 128), and separate the two parts.

14. With a knife or small cutter, cut the wire tie that holds the copper capillary tubing to the adhesive tie-mount on the partition (Figure 129).

15. With a Phillips screwdriver, unscrew and remove the two screws that hold the bulb holder to the partition.

16. In the filter/fans compartment, use a knife or small cutter to cut the two wire ties that hold the temperature sensor bulb to the bulb holder (Figure 130).

17. Slide the bulb holder out through the partition.

18. Slide the sensor bulb out through the partition.

19. Remove the complete thermostat assembly from the unit.

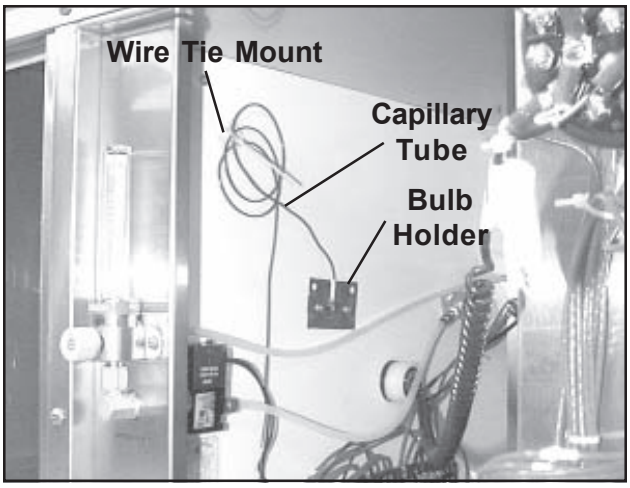

Figure 129. Capillary Tubing and Bulb Holder

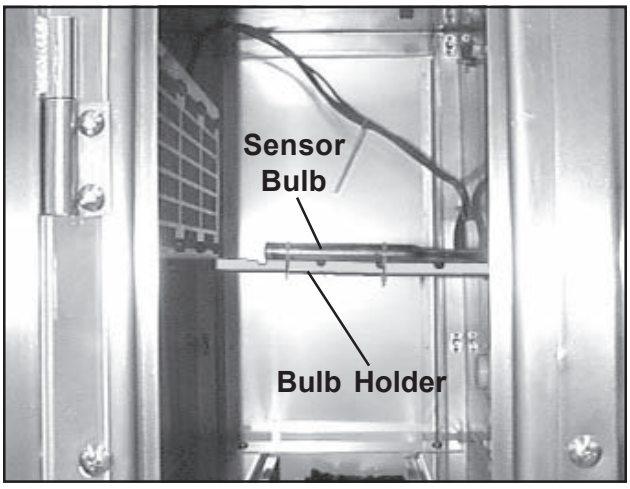

Figure 130. Sensor Bulb and Bulb Holder

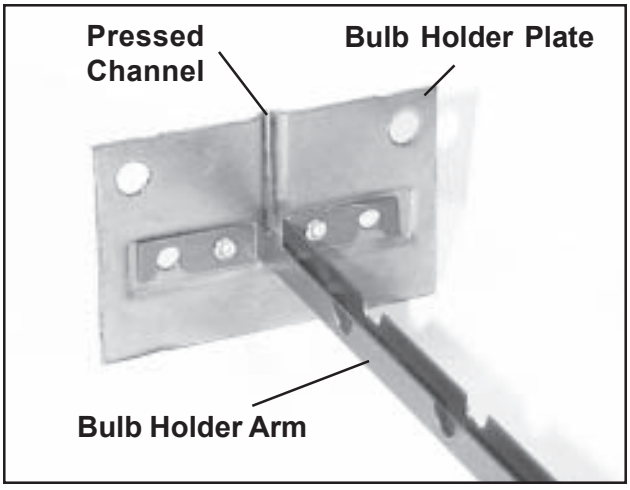

Figure 131. Bulb Holder

Installation

CAUTION: **Be very careful not to crush, crimp, or kink the copper capillary tubing. Such damage effectively ruins the thermostat assembly.**

1. From the electronics compartment, insert the sensor bulb through the opening in the partition and into the filter/fans compartment (Figures 129 and 130).

2. In the same way, insert the bulb holder through the opening. The open side of the bulb holder arm should be on top (Figure 131).

3. Mount the bulb holder to the partition with the two screws/nuts removed earlier (Figure 129). **Note:** Make sure that the capillary tube runs upward through the pressed channel in the bulb holder plate (Figure 131).

4. Secure the sensor bulb to the bulb holder arm with two small wire ties.

5. Remove the cover screw and cover from the new thermostat (Figure 125).

6. Mount the thermostat to the thermostat bracket with the four screws/nuts removed earlier (Figure 128).

7. Remove the knock-out from the end of the thermostat chassis farthest from the dial (Figure 132).

8. Install the rubber grommet removed earlier into this hole (Figure 127).

9. Pass all six wires through the rubber grommet and connect them to the correct terminals on the thermostat (Figure 126).

10. Mount the cover back onto the thermostat.

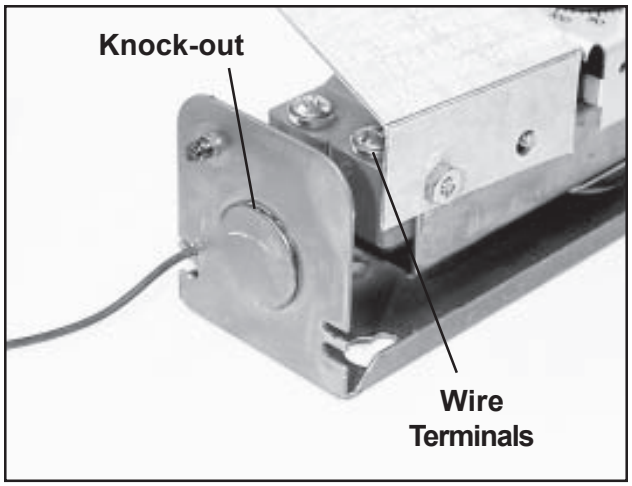

Figure 132. Thermostat Knock-out

11. Mount the thermostat and bracket to the partition wall (Figure 124).

12. Neatly coil up the excess capillary tubing and bind it to the adhesive tie mount with a small wire tie (Figure 129).

13. Replace the Sodalime pan.

14. Close and secure the filter/fans compartment panel (*Page 58*).

15. Close and secure the electronics compartment door (*Page 57*).

16. Plug the power cord into its wall outlet.

Audible Alarm

P/N 853458

CAUTION: **Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

Tool and Supplies Required

- Phillips screwdriver
- Markers, masking tape, tags, or other means to mark wires

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.

2. Unplug the power cord from the electrical outlet.

3. Open the electronics compartment (refer to *Page 57*).

4. Using tags, masking tape, or any other convenient means, tag the wires with the identification of the terminal to which they attach (Figure 123). Failure to mark the wires will make it difficult to connect them correctly later.

5. With a Phillips screwdriver, remove all wires from the rear of the audible alarm.

6. Close the electronics compartment door.

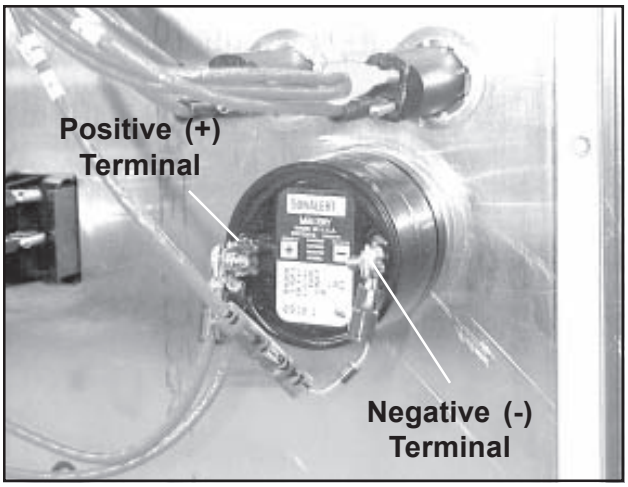

Figure 132. Inside View - Audible Alarm

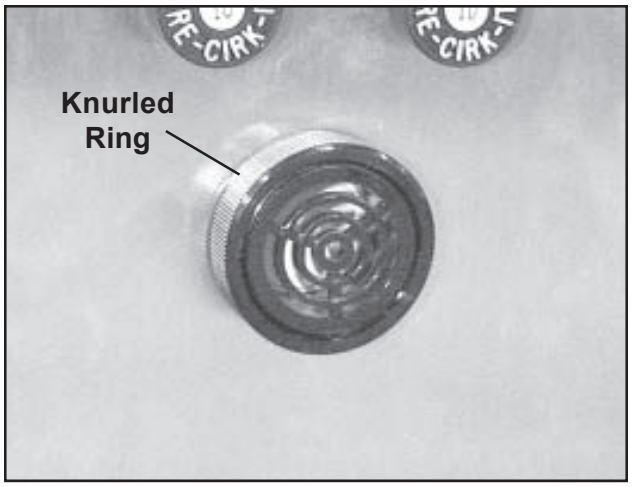

Figure 134. Outside View - Audible Alarm

7. Rotate the knurled ring on the audible alarm counter-clockwise until it comes off (Figure 134).

8. Pull the audible alarm from the rear of the compartment door.

Installation

1. Unscrew the knurled ring from the new audible alarm (Figure 134).

2. From the rear of the compartment panel, insert the audible alarm into its opening.

3. Secure the alarm in place by screwing on the knurled ring.

4. Re-connect the wires to the terminals on the alarm (Figure 133).

5. Close and secure the electronics compartment door.

6. Plug the power cord into its wall outlet.

Solenoid Valve

P/N 853440

CAUTION: **This procedure requires opening the oxygen system, and should not be performed by untrained personnel. Avoid the use of open flames, smoking materials, or equipment capable of producing sparks while performing this procedure.**

CAUTION: **Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

CAUTION: Before proceeding, make sure the oxygen supply is turned off at the source.

Tools and Supplies Required

- Phillips screwdriver
- 3/4-in. wrench
- 11/16-in. wrench
- 7/16-in. wrench
- Thread sealing tape

Removal

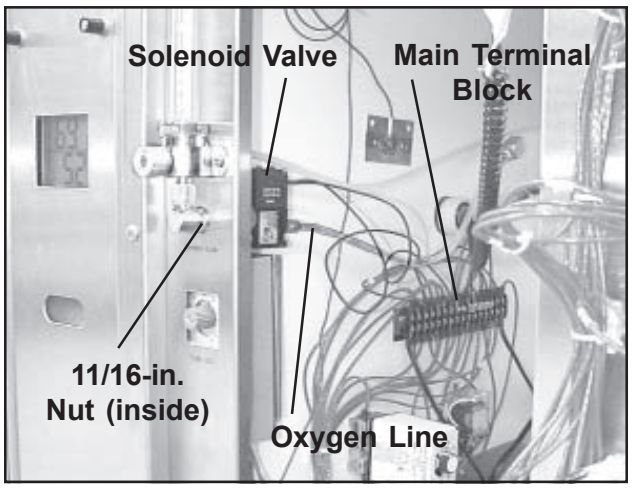

Figure 135. Solenoid Valve and Main Terminal Block

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.
2. Unplug the power cord from the electrical outlet.
3. Turn off the oxygen supply at the source.
4. Open the electronics compartment (refer to *Page 57*).
5. With a 7/16-in. wrench, dis-connect the oxygen line on the rear of the solenoid (Figure 135).
6. Before proceeding, wait 10-minutes to allow any residual oxygen from the system to dissipate.
7. Two wires run from the solenoid to positions **3** and **12** on the main terminal block (Figure 135). With a Phillips screwdriver, dis-connect these two wires from the terminal block.

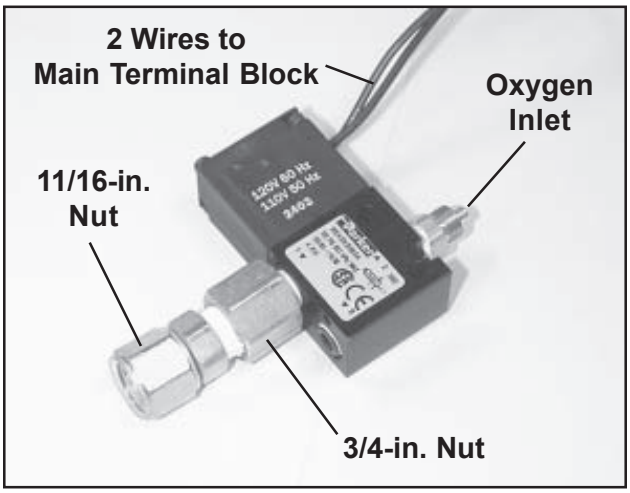

Figure 136. Solenoid Valve

8. The solenoid valve is connected to the rear of the flow meter by straight-thru fittings and three nuts (Figure 136). Unscrew the nut behind the flow meter with a 11/16-in. wrench until it comes free from the flow meter.

9. Remove the solenoid valve.

10. With a 3/4-in. wrench, remove the remain ing nuts and fittings from the solenoid valve for re-use with the new solenoid.

Installation

1. Clean off any old thread sealing tape from the fittings and the flow meter threads.

2. Install the fittings you removed from the old solenoid in *Step 10* to the new solenoid. Seal the joint with thread sealing tape or equivalent.

3. Mount the solenoid assembly to the rear of the flow meter with the 11/16-in. nut. Thread sealing tape is not required on this joint.

4. Connect the two wires to positions **3** and **12** on the main terminal block. Either wire can go to either position.

5. Connect the oxygen line to the rear of the solenoid.

6. Close and secure the electronics compartment door.

7. Turn on the oxygen supply.

8. Plug the power cord into its wall outlet.

Oxygen Flow Meter

P/N 853456

CAUTION: **This procedure requires opening the oxygen system, and should not be performed by un-trained personnel. Avoid the use of open flames, smoking materials, or equipment capable of producing sparks while performing this procedure.**

CAUTION: **Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

CAUTION: Before proceeding, make sure the oxygen supply is turned off at the source.

Tools and Supplies Required

- Phillips screwdriver
- 7/16-in. wrench
- 5/8-in. wrench
- 1/2-in. wrench
- 3/8-in. wrench
- 11/16-in. wrench
- Thread sealing tape

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.

2. Unplug the power cord from the electrical outlet.

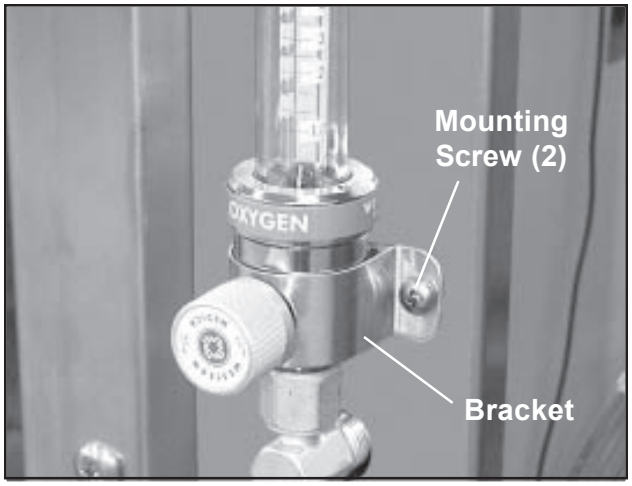

Figure 137. Oxygen Flow Meter Mounting Screws/Nuts

3. Turn off the oxygen supply at the source.

4. Open the electronics compartment (refer to *Page 57*).

5. Remove the solenoid valve from the rear of the oxygen flow meter. Refer to *Solenoid Valve - Removal* and perform *Steps 8* and *9* starting on *Page 118*. **Note:** It is not necessary to dis-connect the oxygen line or the two wires from the solenoid.

6. With a 7/16-in. wrench, dis-connect the oxygen line (Figure 138) on the rear of the flow meter.

7. Before proceeding, wait 10-minutes to allow any residual oxygen from the system to dissipate.

8. With a Phillips screwdriver and a 3/8-in. wrench, remove the two screws/nuts that hold the flow meter bracket to the unit (Figure 137).

7. Remove the flow meter and support plate.

Dis-Assembly

1. With a 5/8-in. wrench, unscrew the elbow fitting from the bottom of the flow meter (Figure 138).

2. With a 1/2-in. wrench, remove the oxygen tubing connector from the rear of the flow meter.

3. Screw the flow meter knob counter-clockwise as far as it will go.

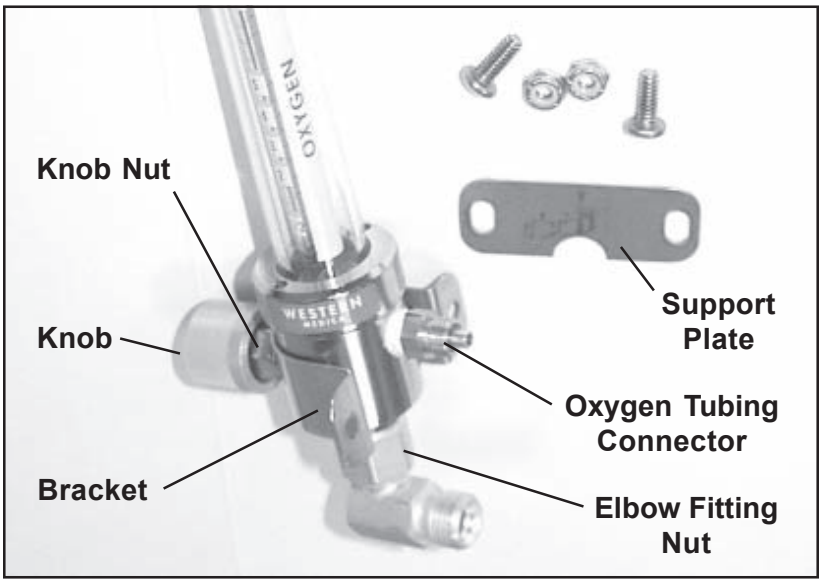

Figure 138. Oxygen Flow Meter and Related Pieces

4. With a 1/2-in. wrench, unscrew the knob nut until the knob comes free.

5. Remove the bracket from the flow meter.

Re-assembly

1. Hold the bracket in place on the flow meter, re-attach the knob, and tighten the knob nut (Figure 138).

2. Screw the flow meter knob fully clockwise until it seats.

3. Mount the oxygen tubing connector to the rear of the flow meter. Seal the joint with thread sealing tape or equivalent.

4. Attach the elbow fitting to the bottom of the flow meter. Make sure it points to the rear.

Installation

1. Mount the flow meter and support plate to the unit and secure with the two screws/nuts (Figure 137).
   Note: The semi-circular cutout on the support plate fits under the oxygen tubing connector. **Note:** Make sure the flow meter is installed perfectly vertical.

2. Re-connect the oxygen line to the tubing connector on the flow meter.

3. Mount the solenoid valve to the rear of the flow meter. Refer to *Solenoid Valve - Installation* and perform *Steps 2* and *3* on *Page 119*.

4. Close and secure the electronics compartment door.

5. Turn on the oxygen supply.

6. Plug the power cord into its wall outlet.

7. Press the main on/off switch to On.

8. Press the oxygen on/off switch to On.

9. Refer to *Controlling Oxygen Flow Rate* on *Page 56*, and reset the oxygen flow rate.

10. Press the oxygen and main on/off switches to Off.

Fan, Ventilating (Electronics Compartment)

P/N 853414

To replace one of the three circulating fans in the filter/fans compartment, refer to *Page 134*.

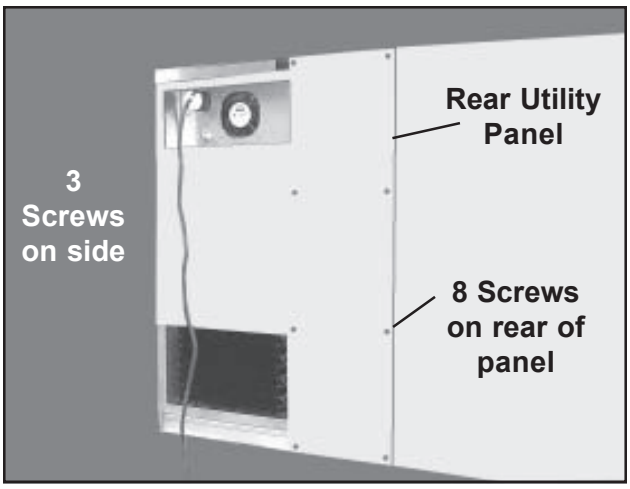

Figure 139. Rear Utility Panel

Figure 140. Ventilating Fan Mounting

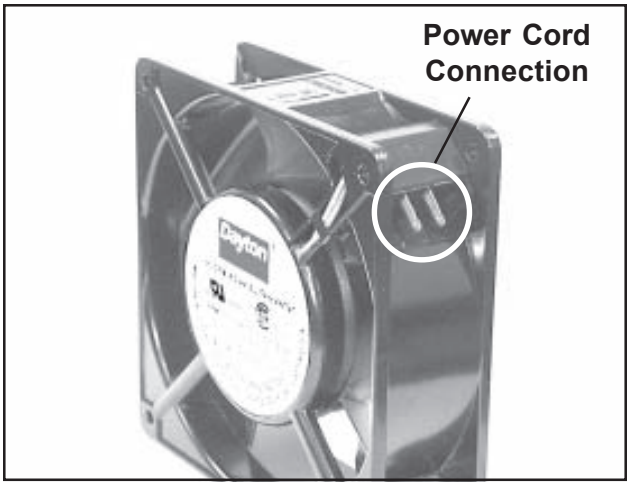

Figure 141. Fan Power Cord Connection

***CAUTION:* Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

Tools and Supplies Required

- Phillips screwdriver
- Utility knife or small cutter
- Small wire ties (3)

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.
2. Unplug the power cord from the electrical outlet.
3. With a Phillips screwdriver, unscrew the eleven retaining screws on the rear utility panel (Figure 139).
4. Remove the rear utility panel.
5. With a Phillips screwdriver, remove the four screws holding the ventilating fan in place (Figure 140).
6. Cut the small wire tie that holds the fan power cord to the red wires from the electric power cord connection.
7. Un-plug the power cord from the fan (Figure 141), and remove the fan.

Installation

1. Plug the fan power cord into the new fan (Figure 141).
2. Gather the power cord and the two red wires from the electric power cord connection together and bind them with a small wire tie.

3. Mount the fan in place and secure with the four screws.

4. Mount the rear utility panel and secure with the eleven screws.

5. Plug the power cord into its wall outlet.

Alarm Time Delay Relay
P/N 853416

Procedure

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.

2. Open the electronics compartment (refer to *Page 57*).

3. Pull the alarm time delay relay out of the octal base (Figure 142).

4. **Note:** An alignment tab on the time delay relay center post matches a slot in the octal base (Figures 143 and 145). Making sure that the tab and slot align, push the new relay fully into place on the octal base.

5. Refer to *Setting the Alarm Time Delay Relay* on *Page 59* and set the relay to the delay you prefer.

6. Close and secure the electronics compartment door.

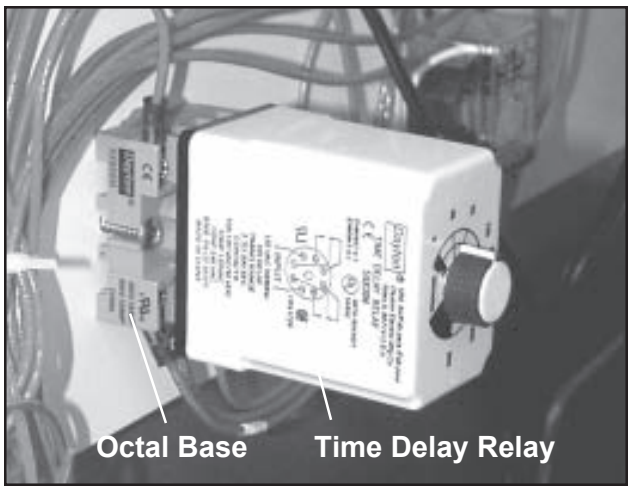

Figure 142. Time Delay Relay

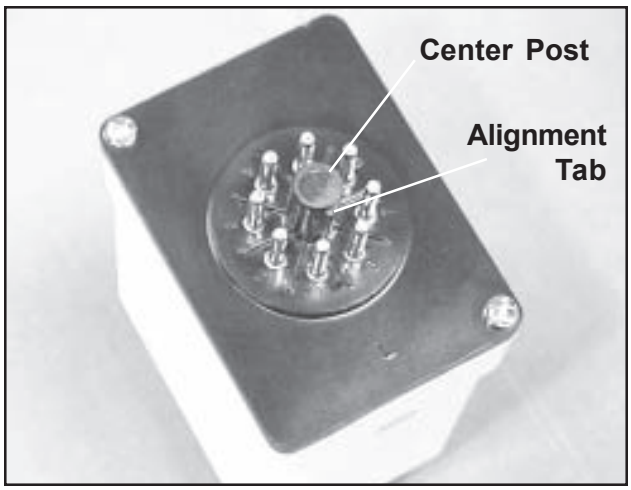

Figure 143. Time Delay Relay Alignment Tab

Octal Base (Alarm Time Delay Relay) P/N 853871

CAUTION: **Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

Tool and Supplies Required

- Phillips screwdriver
- Markers, masking tape, tags, or other means to mark wires

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.

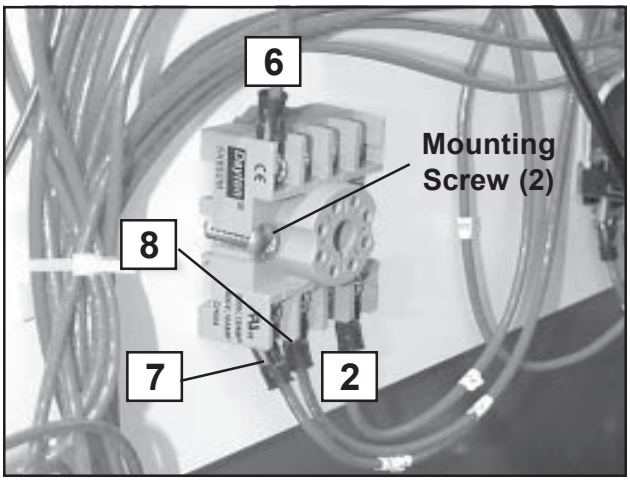

Figure 144. Octal Base Wire Connections

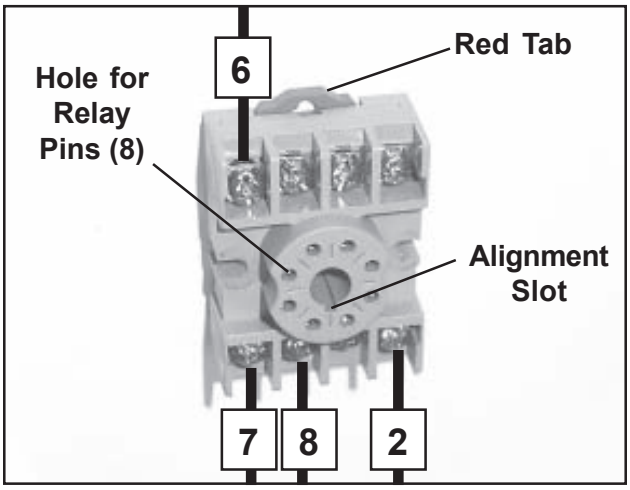

Figure 145. Octal Base

2. Unplug the power cord from the electrical outlet.
3. Open the electronics compartment (refer to *Page 57*).
4. Pull the alarm time delay relay out of the octal base (Figure 142).
5. Mark all four wires on the base with the wire numbers shown in Figure 144 so that you can re-connect them correctly.
6. With a Phillips screwdriver, dis-connect all four wires from the base.
7. With a Phillips screwdriver, unscrew the two screws that hold the base to the partition (Figure 144), and lift out the base.

Installation

1. Mount the octal base to the partition with the two screws removed earlier. Make sure the red tab is on top (Figure 145).
2. Re-connect all four wires to the base.
3. Install the alarm time delay relay. Refer to *Alarm Time Delay Relay, Steps 4* through *6* on *Page 124*.
4. Plug the power cord into its wall outlet.

Relay

P/N 853415

CAUTION: **Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

Tool and Supplies Required

- Phillips screwdriver
- Markers, masking tape, tags, or other means to mark wires

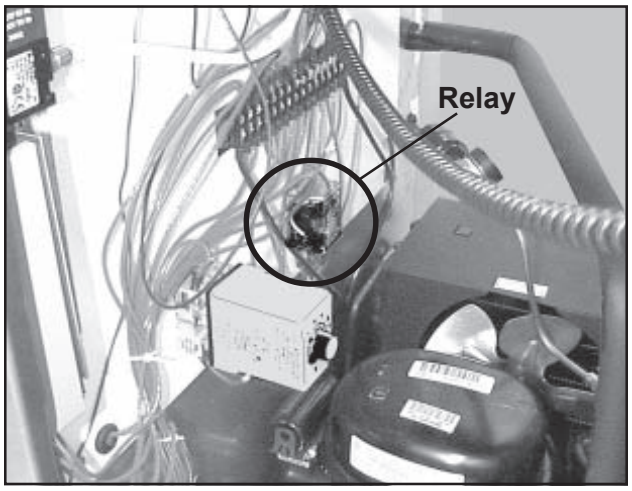

Figure 146. Relay in the Electronics Compartment

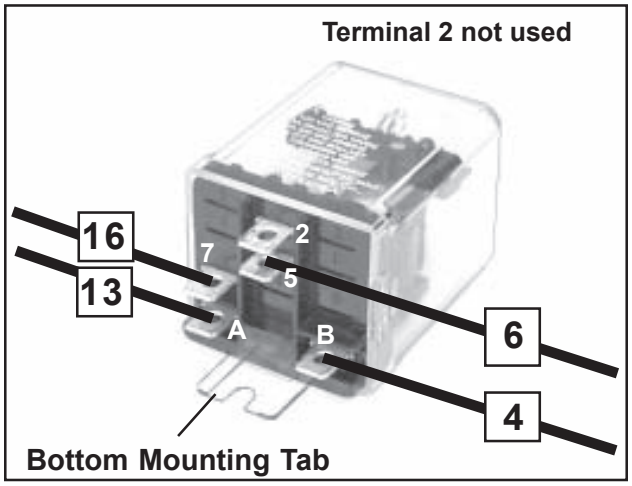

Figure 147. Wire Terminals on the Relay

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.
2. Unplug the power cord from the electrical outlet.
3. Open the electronics compartment (refer to *Page 57*).
4. Mark all four wires on the base with the wire numbers shown in Figure 147 so that you can reconnect them correctly.
5. Pull all four wires off their terminals.
6. With a Phillips screwdriver, unscrew the two screws (top and bottom) holding the relay to the partition, and remove the relay.

Installation

1. Mount the new relay to the partition with the two screws removed earlier.
2. Attach the four wires to the bottom of the relay (Figure 147).
3. Close and secure the electronics compartment door (*Page 57*).
4. Plug the power cord into its wall outlet.

Digital Readout

P/N 854591

Tool Required

- Phillips screwdriver

Removal

1. Open the filter/fans compartment (refer to *Page 58*).
2. With a Phillips screwdriver, un-screw the two screws that hold the digital readout mounting bracket to the rear of the panel (Figure 148).
3. With a Phillips screwdriver, remove the two screws that hold the readout to the bracket.

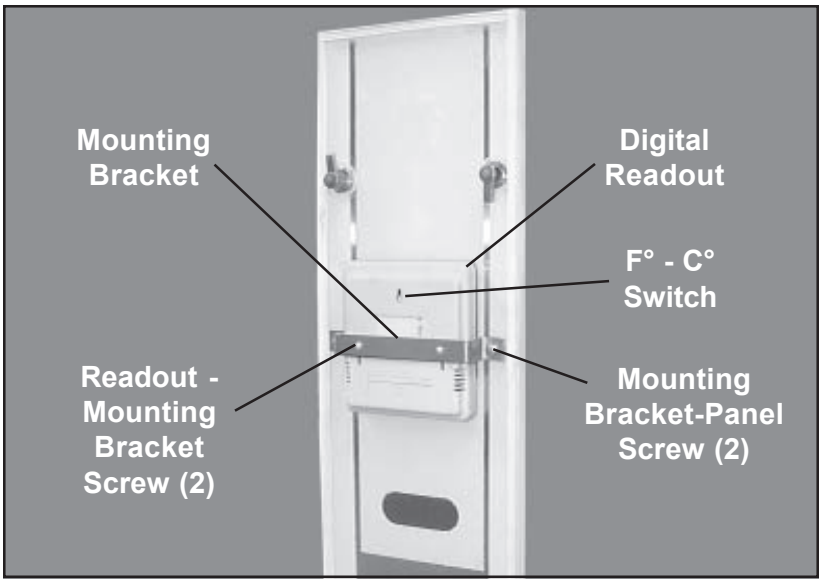

Figure 148. Digital Readout and Mounting Bracket

Installation

1. Mount the bracket to the new readout with the two screws removed above (Figure 148).
2. Mount the readout/bracket assembly to the panel with the two screws removed above.
3. Place the **F° - C°** switch to the desired setting.
4. Make sure there is a battery in the readout. If not, refer to *Page 62*.
5. Replace and secure the filter/fans compartment panel.

Panel, Filter/Fans, Complete
P/N 206874

Procedure

1. Turn all four panel access knobs (Figure 149) one-quarter turn counter-clockwise and pull the old panel completely off the Intensive Care Unit.

2. Look at the rear of the new access panel (Figure 150) and make sure that the locking arms on all four access knobs are vertical. **Note:** The locking arms on the right should point down, and that the arms on the left should point up.

3. Seat the panel in place over the filter/fans compartment opening, and turn all four panel knobs one-quarter turn clockwise to lock the panel in place. **Note:** It is a good idea to tug gently on one of the access knobs to be sure the panel is secure.

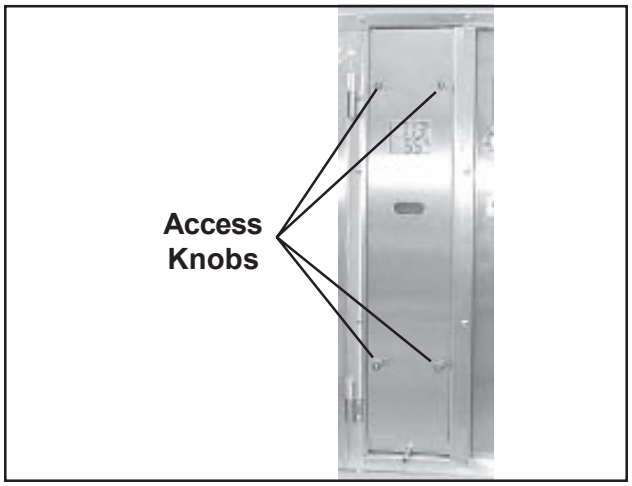

Figure 149. Filter/Fans Compartment Access Knobs

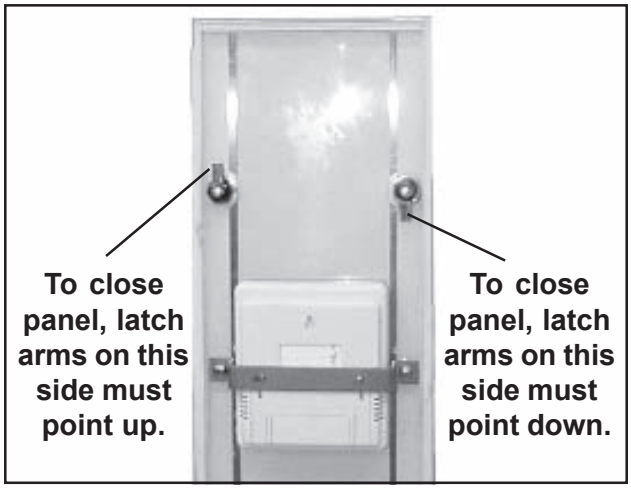

Figure 150. Inside of Filter/Fans Compartment Panel

Note: If the digital readout from the old filter/fans compartment panel is working OK, it can be dis-mounted from the panel and used in some other way, or kept as a spare.

Gasket, Filter/Fans Compartment

P/N 754456

There are two sets of gaskets on the filter/fans compartment. One set is on the rear of the removable panel (front), and the other set is on the rear of the unit behind the rear utility panel. Each set consists of four parts, cut to length and bonded to the the panel or unit. If necessary, you can replace only those gasket segments that are damaged; it may not be necessary to replace all four segments.

Tool Required

- Utility knife
- Razor blade
- Tape measure

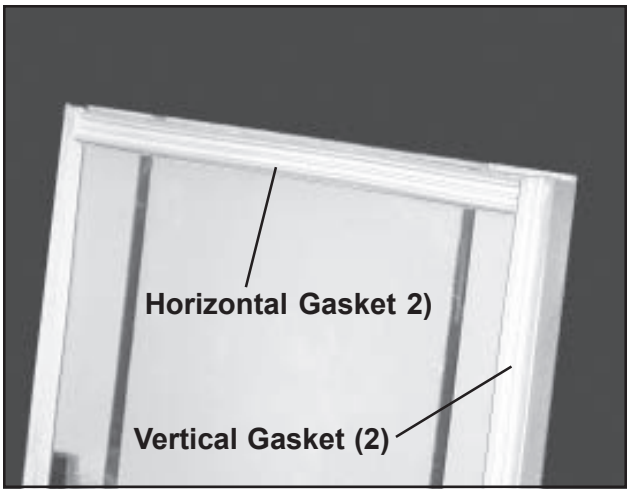

Figure 151. Filter/Fans Compartment Panel Gaskets

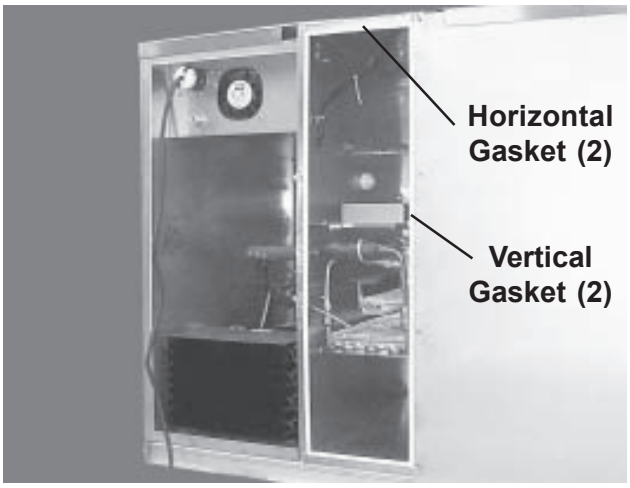

Figure 152. Gaskets on Rear of Filter/ Fans Compartment

1. **Compartment panel:** Open the filter/ fans compartment (refer to *Page 58*).
   Rear of filter fans compartment: Unscrew the eleven retaining screws and remove the rear utility panel (Figure 139).

3. With a utility knife, peel the old gasket off (Figures 151 and 152).

4. With a razor blade, make sure the surface from which the gasket was removed is clean and free of old adhesive.

Installation

1. Measure and cut a piece of gasket material equal in length to the piece being replaced.

2. Peel the protective backing from the new gasket material.

3. Press the new gasket in place on the door.

4. **Compartment panel:** Close the filter/ fans compartment.
   Rear of filter fans compartment: Replace the rear utility panel and secure with the eleven screws.

Filter, Filter/Fans Compartment

P/N 853469

Procedure

1. Open the filter/fans compartment (refer to *Page 58*).
2. Bend the filter until the top or bottom clears the top or bottom mounting bracket (Figure 153).
3. Remove the filter from the unit.
4. Fit the upper edge of the new filter to the upper filter bracket.
5. Bend the filter slightly and fit the lower end into the lower filter bracket.
6. Close and secure the filter/fans compartment panel.

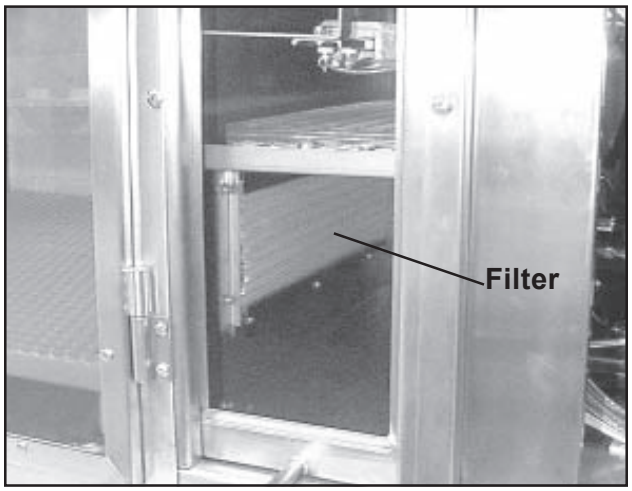

Figure 153. Filter/Fans Compartment Filter

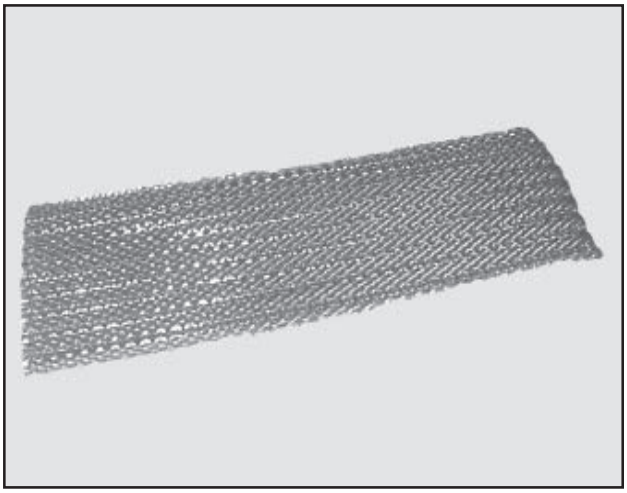

Figure 154. Filter/Fans Compartment Filter (removed from unit)

Sodalime Pan

P/N 206537

CAUTION: **Sodalime can cause burns to eyes and skin. Dust can cause irritation to skin and eyes on contact. Harmful if swallowed.**

CAUTION: **Use safety goggles or glasses, PVC or rubber gloves, and a nuisance dust mask when handling Sodalime.**

CAUTION: **Dispose of Sodalime waste and water rinses only in accordance with local, state and Federal regulations.**

CAUTION: **For complete information, refer to the Material Safety Data Sheet (MSDS No. 005213) included in the Appendix to this manual.**

CAUTION: **Wash your hands thoroughly after handling Sodalime.**

Removal

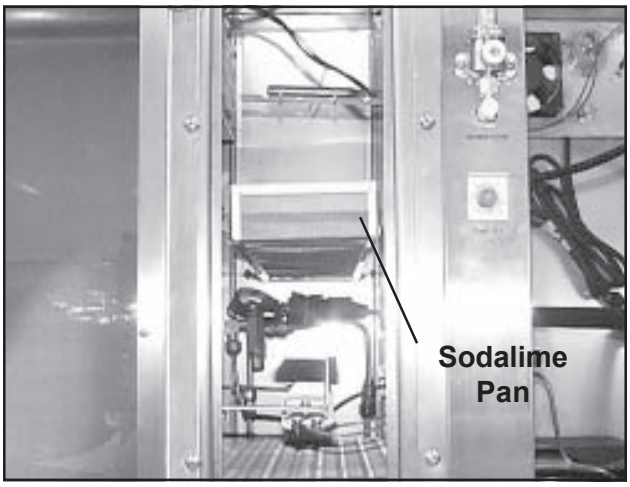

Figure 155. Sodalime Pan in Filter/Fans Compartment

1. Open the filter/fans compartment (refer to *Page 58*).
2. Carefully, and without spilling the contents, remove the Sodalime pan (Figure 155).
3. Empty the Sodalime pan.

Dispose of Sodalime waste and water rinses only in accordance with local, state and Federal regulations.

Installation

4. Open a single container of Sodalime.
5. Pour the contents of the container into the new pan and smooth it out to an even depth.
6. Carefully, replace the filled pan into the compartment.
7. Replace and secure the filter/fans compartment panel.
8. When you are finished re-filling the Sodalime pan, wash your hands thoroughly.

Heater, Electric

P/N 853455

***CAUTION:* Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

Tools Required

- 3/8-in. wrench
- 11/32-in. wrench
- Phillips screwdriver

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.

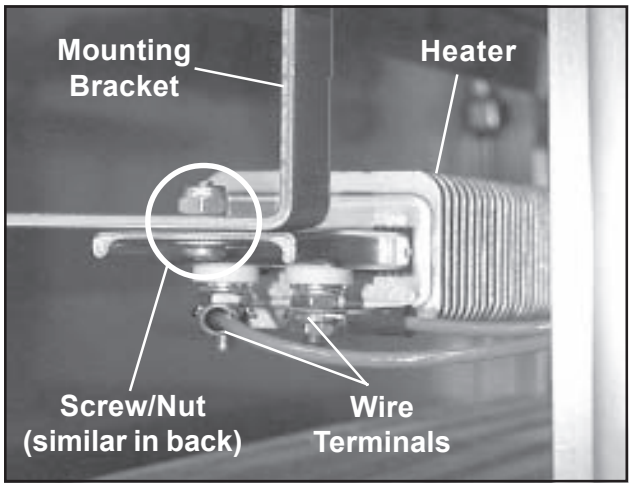

Figure 156. Front View of Heater

2. Unplug the power cord from the electrical outlet.

3. Open the filter/fans compartment (refer to *Page 58*).

***CAUTION:* Before working on the heater, make sure it is cool enough to touch without burning yourself.**

4. Carefully, and without spilling the contents, remove the Sodalime pan (Figure 148). Place the pan where it will be safe and not accidentally spilled. Observe the cautions shown on *Page 131*.

5. With a 3/8-in. wrench, dis-connect the two wires from the terminals on the lower front of the heater (Figure 156).

6. With a Phillips screwdriver and a 11/32-in. wrench, remove the screw/nut holding the front end of the heater to the mounting bracket.

7. With a Phillips screwdriver, unscrew the eleven retaining screws on the rear utility panel (Figure 139).

8. Remove the rear utility panel.

9. The rear of the heater is mounted to a bracket similar to the front. Remove the screw/nut holding the rear end of the heater to the mounting bracket.

10. Lift out the heater.

Installation

1. Hold the heater in position and mount the rear end to the mounting bracket with the screw/nut removed earlier (Figure 156).

2. Mount the front end of the heater to the mounting bracket with the screw/nut removed earlier.

3. Connect both wires to the terminals on the front end of the heater.

4. Re-mount the rear utility panel and secure with the eleven screws.

5. Replace the Sodalime pan.

6. Replace and secure the filter/fans compartment panel.

7. Plug the power cord into its wall outlet.

Fan, Circulating (Filter/Fans Compartment)

P/N 853414

To replace the ventilating fan in the electronics compartment, refer to *Page 123*.

CAUTION: **Before proceeding, make sure the unit is Off, and the electric power cord un-plugged.**

Tools Required

- 3/8-in. wrench
- Phillips screwdriver
- Utility knife or small cutter
- Small wire ties (3)
- Electrical tape

Removal

1. Make sure that the main on/off switch is Off and the amber light in the switch is out.

2. Unplug the power cord from the electrical outlet.

3. Remove the right animal compartment door (refer to *Page 74*).

4. Open the filter/fans compartment (refer to *Page 58*).

5. Carefully, and without spilling the contents, remove the Sodalime pan (Figure 155). Place the pan where it will be safe and not accidentally spilled. Observe the cautions shown on *Page 131*.

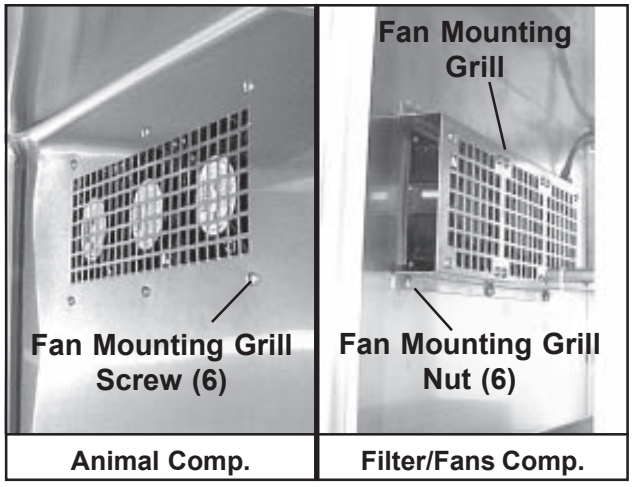

Figure 157. Fan Mounting Grill, Screws and Nuts

6. With a Phillips screwdriver, unscrew the eleven retaining screws on the rear utility panel (Figure 139).

7. Remove the rear utility panel.

8. With a Phillips screwdriver and a 3/8-in. wrench, remove the six screws/nuts that hold the fan mounting grill to the partition. **Note:** The nuts are in the filter/fans compartment; the screw heads are in the animal compartment (Figure 157).

9. Remove the complete fan mounting grill and fan assembly.

10. With a Phillips screwdriver, remove the four screws that hold the fan to the fan mounting grill.

11. Unplug the fan power cord from the fan, and remove the fan.

Installation

1. Plug the fan power cord into the new fan.

2. Install the new fan into the fan mounting grill with the four screws removed earlier.

3. Mount the fan mounting grill onto the partition with the six screws/nuts remove earlier.

4. Re-mount the rear utility panel and secure with the eleven screws.

5. Replace the Sodalime pan.

6. Replace and secure the filter/fans compartment panel.

7. Re-hang the right animal compartment door.

8. Plug the power cord into its wall outlet.

Notes:

Chapter 6 - Troubleshooting

WARNING: **Oxygen is a highly combustible gas. Avoid the use of open flames, smoking materials, or equipment capable of producing sparks in any area in which oxygen is being used. Before servicing or performing maintenance on this equipment, make sure the oxygen supply is turned Off at the source.**

General

The following procedures will help you fix most of the problems that you might encounter with your SSCI Regal Intensive Care Unit. If necessary, please feel free to call SSCI Customer Service at (847) 537-9320, ext. 3518 (in Illinois) or 1-800-323-7366. Our experienced technical support personnel will be glad to help you.

For more information on contacting SSCI, refer to *SSCI Contact Information* on *Page 7*.

Part numbers for available replacement parts are shown in Table 3 on *Pages 71* and *72*. To order replacement parts, refer to *Parts Ordering Procedure* on *Page 73*.

Possible problems are listed below:

Page numbers shown in the *Remedial Action* sections direct you to step-by-step directions on replacing specific parts. Refer to *Chapter 5, Repairs and Replacements.*

If your Intensive Care Unit must be returned to SSCI for repairs, refer to *Returning the Intensive Care Unit for Repairs* below for directions.

Returning the Intensive Care Unit for Repairs

RMA Numbers

If your Intensive Care Unit should require return to SSCI for repairs, discuss the problem with one of our Customer Service Representatives. Obtain an RMA number (Return Merchandise Authorization) from him before shipping the unit back.
Note: SSCI will *not* accept merchandise returned without an RMA number.

Packing and Shipment

If you were able to keep the shipping carton, repack the unit into the carton. Shipping the unit securely mounted to a pallet would be a good idea.

If the shipping carton is not available, package the unit securely in a suitable container. Ship documentation with the unit including:

- Destination
- RMA Number
- Your name, company and address
- Your telephone number
- A description of the reason for returning the base

Safety Reminder

CAUTION: **When working with oxygen, Sodalime, or the fuel cell, observe the cautions listed under *Safety* on *Pages 3* and *4* in *Chapter 1.* When working with electrical components or wiring, make sure the main on/off switch is Off and the power cord un-plugged.**

WARNING: **Do not attempt to work on or dis-assemble the cooling unit as it contains MP39 refrigerant gas under pressure. If service is required on the unit, call SSCI Customer Service at 1-800-323-7366, or a certified refrigeration serviceman.**

The ICU will not turn on.

Remedial Action

Note: When you press the main on/off switch, the amber light in the switch should come on, and the ventilating and circulating fans should start.

First: Check the electric power cord. Make sure it is firmly plugged in at both ends.

Second: If this is a new installation, does it meet the requirements outlined under *Electrical Requirements* on *Page 34*? If not, you may be tripping a building circuit breaker because your supply line is inadequate. Call your local electrician and have the correct line installed.

Third: Check to see if either circuit breaker on the unit has tripped. Refer to *Re-setting the Circuit Breakers* on *Page 60*.

CAUTION: **Before working on the electrical system, make sure the unit is Off and the electric power cord un-plugged.**

Fourth: Open the electronics compartment and make sure that the wire connections inside the electric power cord connection and the system ground are tight. Refer to Figure 24 on *Page 21*.

Fifth: When the main on/off switch is On, the amber light in the switch should be on. If this light does not illuminate, check the wire connections on the back of the switch. If they are all secure, you may have a bad switch. Order P/N 853422 and refer to *Page 99* for replacement instructions.

Sixth: If these actions do not resolve the problem, call SSCI Customer Service at (800) 323-7366.

Circuit breakers keep tripping.

Remedial Action

First: If this is a new installation, does it meet the requirements outlined under *Electrical Requirements* on *Page 34*? If not, you may be tripping a building circuit breaker because your supply line is inadequate. Call your local electrician and have the correct line installed.

Second: Is there any consistent pattern to when the circuit breaker trips? For example, does it happen only when you are using cooling? This can give you a clue as to where in the ICU the problem lies. Examine the components and wiring associated with that system and look for loose connections, worn or damaged wiring, etc.

Third: Is your area subject to power surges or wide variations in the incoming power supply? If this is the case, you may want to consider the installation of a power conditioner.

Fourth: If these actions do not resolve the problem, call SSCI Customer Service at (800) 323-7366, or a qualified electrician.

Oxygen flow is inadequate.

Remedial Action

First: Check your oxygen supply. Is the tank empty or is the pressure regulator improperly adjusted?

Second: Make sure that all four panel access knobs on the filter/fans compartment are firmly locked. Failure to lock all four of these knobs will result in oxygen leakage through the air grills between the animal and filter/fans compartments, and consequent loss of oxygen past the loose panel.

Third: Is the oxygen flow meter adjusted properly? Refer to *Controlling Oxygen Flow Rate* on *Page 56*.

Fourth: Is the set point on the oxygen concentration meter correctly set? Refer to *Using Oxygen* on *Page 51*.

CAUTION: **If oxygen pressure, flow rate, and concentration are correctly set, and the oxygen flow is still low, you probably have a leak in the system. Turn the ICU off and observe all oxygen safety measures. Refer to *Oxygen Warnings* on *Page* 3.**

Fifth: Have your oxygen supply service check your supply lines and connections for leaks.

CAUTION: **Before working on the electrical system, make sure the unit is Off and the electric power cord un-plugged.**

Sixth: Open the electronics compartment and check all oxygen lines. Check for loose connections, and damaged or kinked oxygen lines.

Seventh: Your solenoid valve may be defective. Order P/N 853440 and refer to *Page 118* for replacement instructions.

Eighth: Your oxygen flow meter may be defective. Order P/N 853456 and refer to *Page 120* for replacement instructions.

Oxygen flow is excessive.

Remedial Action

First: Make sure your oxygen pressure regulator is correctly adjusted?

Second: Is the oxygen flow meter adjusted properly? Refer to *Controlling Oxygen Flow Rate* on *Page 56.*

Third: Is the set point on the oxygen concentration meter correctly set? Refer to *Using Oxygen* on *Page 51.*

Fourth: Your solenoid valve may be defective. Order P/N 853440 and refer to *Page 118* for replacement instructions.

Fifth: Your oxygen flow meter may be defective. Order P/N 853456 and refer to *Page 120* for replacement instructions.

Alarm keeps going off.

Remedial Action

First: Make sure that all four panel access knobs on the filter/fans compartment are firmly locked. Failure to lock all four of these knobs will result in oxygen leakage through the air grills between the animal and filter/fans compartments, and consequent loss of oxygen past the loose panel. The alarm system may be triggered by the system's inability to maintain the requested oxygen concentration due to the leakage.

Second: Your system may be alerting to minor, transient faults. Refer to *Setting the Alarm Time Delay Relay* on *Page 59*, and set the delay to a longer period.

Third: Check the set-point setting on the oxygen concentration meter and the flow rate setting on the oxygen flow meter. If these are incorrectly set, the ICU may be having difficulty supplying oxygen fast enough. Refer to *Using Oxygen* on *Page 51* and *Controlling the Oxygen Flow Rate* on *Page 56.*

Fourth: You may be leaking oxygen through the animal compartment doors or the filter/fans compartment. Make sure the doors and the panel are securely closed. Refer to *Opening and Closing the Doors* on *Page 48* and *Accessing the Filter/Fans Compartment* on *Page 58.*

Fifth: You may be leaking oxygen around the animal compartment doors or the filter/fans compartment. Inspect the gaskets on these items and replace if worn or broken. Refer to *Door Gasket* on *Page 76* or *Gasket, Filter/Fans Compartment* on *Page 129* for part numbers and replacement instructions.

The alarm system does not work.

Remedial Action

First: Make sure that the main on/off switch and the oxygen on/off switch are On. Both these switches must be On for the alarm system to operate.

Second: Make sure that the alarm time delay relay is seated securely in place and is properly set. Refer to *Setting the Alarm Time Delay Relay* on *Page 59*. Also, make sure the four wires are securely connected to the octal base under the relay.

Third: When the alarm on/off switch is On, the amber light in the switch should be on. If this light does not illuminate, check the wire connections on the back of the switch. If they are all secure, you may have a bad switch. Order P/N 853422 and refer to *Page 99* for replacement instructions.

Fourth: Check the wire connections at the rear of the audible alarm. If they are secure, the audible alarm may be defective. Order P/N 853458 and refer to *Page 116* for replacement instructions.

Heat will not come on or will not hold constant.

Remedial Action

First: Make sure the temperature set dial is set to a higher-than-ambient temperature.

Second: Press the heat on/off switch several times and make sure the amber light in the switch comes on. If the temperature set dial is set to a higher-than-ambient temperature, the system light should also come on. If the system light does not come on, it is a strong hint that a deeper problem exists in the heat system.

Third: Check the circuit breakers to be sure they haven't tripped. Reset them if necessary. Refer to *Re-setting the Circuit Breakers* on *Page 60.*

CAUTION: **Before working on the electrical system, make sure the unit is Off and the electric power cord un-plugged.**

Fourth: Check all wire connections behind the heat on/off switch, on the thermostat, and on the heater.

Fifth: If not of the above fix the problem, replace the relay. Order P/N 853415, and refer to Page 126 for replacement instructions.

Sixth: If replacing the relay does not help, you probably have a defective thermostat or heater. Try operating the cooling system. If it too fails, replace the thermostat. Order P/N 853421 and refer to *Page 113* for replacement instructions.

Seventh: If the thermostat is OK, replace the heater. Order P/N 853455 and refer to *Page 132* for replacement instructions.

Cooling will not come on or will not hold constant.

Remedial Action

First: Make sure the temperature set dial is set to a lower-than-ambient temperature.

Second: Press the cooling on/off switch several times and make sure the amber light in the switch comes on. If the temperature set dial is set to a lower-than-ambient temperature, the system light should also come on. If the system light does not come on, it is a strong hint that a deeper problem exists in the cooling system.

Third: Check the circuit breakers to be sure they haven't tripped. Reset them if necessary. Refer to *Re-setting the Circuit Breakers* on *Page 60*.

CAUTION: **Before working on the electrical system, make sure the unit is Off and the electric power cord un-plugged.**

Fourth: Check all wire connections behind the cooling on/off switch, on the thermostat, and on the cooling system.

Fifth: If none of the above fix the problem, you probably have a defective thermostat or cooling system. Try operating the heat system. If it too fails, replace the thermostat. Order P/N 853421 and refer to *Page 113* for replacement instructions.

Sixth: If the thermostat is OK, a problem exists in the cooling system. Call SSCI Customer Service at (800) 323-7366, or a certified refrigeration serviceman.

WARNING: **Do not attempt to work on or disassemble the cooling unit as it contains MP39 refrigerant gas under pressure. If service is required on the unit, call SSCI Customer Service at 1-800-323-7366, or a certified refrigeration serviceman.**

Floor heat doesn't work or will not hold constant.

Remedial Action

There are two sets of floor temperature controls: one for the left side and one for the right. Make sure you are operating the correct set of controls.

First: Make sure the temperature control knob is set to a higher-than-ambient temperature.

Second: Press the on/off button several times and make sure the amber light in the switch comes on. If the temperature control knob is set to a higher-than-ambient temperature, the system light should also come on. If the system light does not come on, it is a strong hint that a deeper problem exists in the system.

Third: Check the fuse for the system and make sure it hasn't blown. Replace it if necessary. Refer to *Replacing Floor Temperature Fuses* on *Page 61*.

CAUTION: **Before working on the electrical system, make sure the unit is Off and the electric power cord un-plugged.**

Fourth: Check all wire connections behind the controls.

Fifth: If none of the above fix the problem, you probably have a defective floor temperature controller. Replace the floor temperature controller. Order P/N 853844 and refer to *Page 109* for replacement instructions.

Sixth: If this does not fix the problem, you probably have a bad heating pad. This problem cannot be fixed in the field. Return the unit to SSCI for repairs. Refer to *Returning the Intensive Care Unit for Repairs* on *Page 138*.

Ventilating fan does not work.

Remedial Action

First: Make sure that electrical power to the unit is OK and that the main on/off switch is On.

Second: Check the circuit breakers to be sure they haven't tripped. Reset them if necessary. Refer to *Re-setting the Circuit Breakers* on *Page 60.*

CAUTION: **Before working on the electrical system, make sure the unit is Off and the electric power cord un-plugged.**

Third: Remove the rear utility panel (Figure 139 on *Page 123*) and check the wire connections to the fans in the rear of the electronics compartment (Figures 158 and 159 on *Page 131*). Make sure the connections are tight. If the ICU fan wiring has been serviced lately, make sure that the wires have been re-connected correctly.

Fourth: Are the three circulating fans in the filter/fans compartment operating as they should? If they are, check to see if the power cord is securely plugged into the ventilating fan (Figure 141 on *Page 123*). If the power cord is secure, you probably have a bad ventilating fan. Replace the fan. Order P/N 853414 and refer to *Page 123* for replacement instructions.

Fifth: If the circulating fans are not working either, check the other electrical functions in the ICU. If none of the electrical functions are working, refer to *The ICU will not turn on* on *Page 139.*

Circulating fan does not work.

Remedial Action

First: Make sure that electrical power to the unit is OK and that the main on/off switch is On.

Second: Check the circuit breakers to be sure they haven't tripped. Reset them if necessary. Refer to *Re-setting the Circuit Breakers* on *Page 60*.

CAUTION: **Before working on the electrical system, make sure the unit is Off and the electric power cord un-plugged.**

Third: Remove the rear utility panel (Figure 139 on *Page 123*) and check the wire connections to the fans in the rear of the electronics compartment (Figures 158 and 159 on *Page 131*). Make sure the connections are tight. If the ICU fan wiring has been serviced lately, make sure that the wires have been re-connected correctly.

Fourth: Are all three circulating fans not working, or just one? Is the electronics compartment ventilating fan working? If one circulating fan is not working but the the other two are OK, check the power cord connection on that one fan. If the power cord is secure, you probably have a bad fan. Replace the fan. Order P/N 853414 and refer to *Page 134* for replacement instructions.

Fifth: If the other circulating fans are not working either, check the other electrical functions in the ICU. If none of the electrical functions are working, refer to *The ICU will not turn on* on *Page 139*.

No readings on digital readout.

Remedial Action

First: The battery is probably dead. Refer to *Page 62* and replace the AAA battery in the readout.

Second: If replacing the battery does not make the readout work, the readout is probably bad. Replace the digital readout. Order P/N 854591 and refer to *Page 127* for replacement instructions.

Excessive carbon dioxide in the animal compartment.

Remedial Action

First: The Sodalime supply in the filter/fans compartment is probably exhausted. Replace the Sodalime with fresh material. Refer to *Refilling the CO_2 Filter* on *Page 65*.

Second: Make sure the circulating fans in the filter/fans compartment are working. Refer to *Circulating fan does not work* on *Page 149*.

Third: Make sure that the air inlet grill and the air outlet grill (Figure 3 on *Page 9*) are clear and unobstructed.

Fourth: Make sure that your set-point setting on the oxygen concentration meter is correct. Refer to *Using Oxygen* on *Page 51*.

Fifth: Make sure that the flow rate on the oxygen flow meter is correct. Refer to *Controlling Oxygen Flow Rate* on *Page 56*.

Sixth: Check your oxygen supply and pressure regulator setting.

Seventh: Refer to *Oxygen flow is inadequate* on *Page 141*.

No reading on oxygen concentration meter.

Remedial Action

First: You may have an exhausted fuel cell in the oxygen sensor. Replace the fuel cell. Order P/N 853396 and refer to *Page 68* for replacement instructions.

CAUTION: **Before working on the electrical system, make sure the unit is Off and the electric power cord un-plugged.**

Second: The spiral cord between the fuel cell and the oxygen concentration meter may be loose. Check the rear of the oxygen concentration meter and make sure the spiral cord is firmly connected.

Third: One of the other wires on the rear of the oxygen concentration meter may be loose. Make sure that all wires are in place and tight.

Fourth: The oxygen sensor may be bad. Replace the sensor. Order P/N 853395 and refer to *Page 88* for replacement instructions.

Fifth: The oxygen concentration meter may be bad. Replace the meter. Order P/N 853436 and refer to *Page 92* for replacement instructions.

Calibration knob will not move the calibration needle

Remedial Action

This is almost always the symptom of an exhausted fuel cell in the oxygen sensor. Replace the fuel cell. Order P/N 853396 and refer to *Page 85* for replacement instructions.

Cannot move the set-point needle in the oxygen concentration meter.

Remedial Action

CAUTION: **Before working on the electrical system, make sure the unit is Off and the electric power cord un-plugged.**

First: A wire connection from the potentiometer to the oxygen concentration meter may have come loose from the meter. Refer to Figure 101 on *Page 93* and make sure that both connections are in place and tight.

Second: A wire on the rear of the potentiometer may be broken off (Figure 110 on *Page 97*). Have a person skilled in soldering re-solder the wire in place. If this is not possible, replace the potentiometer. Order P/N 853397 and refer to *Page 93* for replacement instructions.

Third: The potentiometer itself maybe be bad. Replace the potentiometer. Order P/N 853397 and refer to *Page 96* for replacement instructions.

Floor temperature fuse keeps blowing.

Remedial Action

CAUTION: **Before working on the electrical system, make sure the unit is Off and the electric power cord un-plugged.**

First: Check all wire connections behind the controls. Make sure that all wire connections are correctly in place and secure. Check for worn or burned wires which may be the source of a short circuit.

Second: If the wire connections are all OK, you probably have a defective temperature controller. Replace the floor temperature controller. Order P/N 853844 and refer to *Page 109* for replacement instructions.

Notes:

Appendix

General

This Appendix contains Material Data Safety Sheets (MSDS) for Sodalime and MP39 Refrigerant. You can keep the MSDSs here in the Owner's Manual, place them in a file where they can be accessed by concerned individuals, or post them in a readily viewed location.

Note: *Material Safety Data Sheets must be easily available to all persons who work with the Regal Intensive Care Unit.*

Contents

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Puritan Medical Products

Puritan Medical Products, Inc.
9101 Bond Street
Overland Park, KS 66214
(913) 495-3600

MATERIAL SAFETY DATA SHEET, NO. 005213
SODALIME ®

(CO_2 ABSORBENT - SODA LIME U.S.P./N.F.)

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Issue Date:	Revised February, 2003
Distributor's Name:	Puritan Medical Products, Inc.
Address:	9101 Bond Street, Overland Park, Kansas 66214
Emergency Phone No:	1-800-949-7937
All other inquiries:	913-495-3600
Manufacturer's Name:	Molecular Products Ltd.
Address:	Mill End Thaxted Essex, U.K. CM6 2LT
Chemical Name and Synonyms:	Calcium Hydroxide; Sodium Hydroxide
Trade Name and Synonyms:	SODASORB® Absorbent, Sodalime
Chemical Family:	Metal hydroxides
Formula:	$Ca(OH)_2$, NaOH

SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS

Material	Volume %	CAS No.	OSHA PEL	ACGIH TLV / STEL
Calcium hydroxide:	> 73%	1305-62-0	5 mg/cubic meter	5 mg/cubic meter
Sodium hydroxide:	< 4%	1310-73-2	2 mg/cubic meter*	2 mg/cubic meter*
Water:	< 19%	7732-18-5	None listed	None listed

* Ceiling limit

SECTION 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

CAUTION!	Can cause burns to eyes and skin.

Effects of Overexposure

Inhalation:	Dust can cause irritation and injury to the respiratory system.
Direct contact:	Can cause severe irritation to the eyes on contact; can cause irritation to the skin on contact.
Ingestion:	Harmful if swallowed
Carcinogenicity:	Not listed in NTP or IARC; not regulated as a carcinogen by OSHA

SECTION 4 - FIRST AID MEASURES

Emergency and First Aid Procedures

Inhalation:		Remove from exposure. Obtain prompt medical attention.
Direct contact:	Eyes:	Irrigate thoroughly with clean water. Obtain medical attention.
	Skin:	Drench with clean water
Ingestion:		Wash out mouth thoroughly. Do not induce vomiting. Obtain medical attention.

SECTION 5 - FIRE FIGHTING MEASURES

Flash Point:	N/A
Flammable Limit:	N/A
Autoignition:	N/A
Extinguishing Media:	Non-flammable
Special Fire Fighting Procedures:	Material is non-flammable, use water, foam or CO_2 on packaging.
Unusual Fire and Explosion Hazards:	None

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Steps to be taken in case material is released or spilled:	Avoid breathing dust. Avoid skin and eye contact. Contain material. Sweep or vacuum up loose material.

SECTION 7 - HANDLING AND STORAGE

Precautions to be taken in handling and storage:	Store in a clean, dry environment. Avoid direct sunlight. Keep containers closed.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Eye Protection:	Safety goggles or glasses
Protective Gloves:	PVC or rubber
Respiratory Protection:	Nuisance dusk mask recommended
Other Protective Equipment:	Safety shoes when handling cartons of materials

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Molecular Weight:	N/A
Boiling Point:	N/A
Vapor Pressure:	N/A
Specific Gravity (Air = 1.0):	N/A
Solubility in Water:	Slight
Percent Volatile by Volume:	< 19% water
Evaporation Rate:	Slow, water only
Appearance, odor and state:	White or colored solids

SECTION 10 - STABILITY AND REACTIVITY

Stability:	Stable
Conditions to Avoid:	Converts to calcium and sodium carbonate when exposed to air
Materials to Avoid:	Acids, chloroform or trichloroethylene
Hazardous Decomposition Products:	N/A
Hazardous Polymerization:	Will not occur

SECTION 11 - TOXICOLOGICAL INFORMATION

Calcium hydroxide:	LD_{50}	7.3 g/kg rat
Sodium hydroxide:	LD (lo)	500 mg/kg rbt

SECTION 12 - ECOLOGICAL INFORMATION

No adverse ecological effects are expected.

SECTION 13 - DISPOSAL CONSIDERATIONS

Waste Disposal Method:	Dispose of all product wastes and water rinses in accordance with current local, state, and Federal regulations.

SECTION 14 - TRANSPORT INFORMATION

DOT / IMO Shipping Name:	None
Hazard Class:	Non-hazardous material
Identification Number:	N/A
Product RQ:	None
Shipping Label(s):	N/A
Placard (when required):	N/A
Special Shipping Information:	Ship in strong outer packaging

SECTION 15 - REGULATORY INFORMATION

The following information concerns selected regulatory requirements potentially applicable to this product. Not all requirements are identified. Users of this product are responsible for their own regulatory compliance on a Federal, state, and local level.

U.S. Federal Regulations:

CERCLA:	Reportable Quantity: None
SARA:	Extremely Hazardous Substances: None Threshold Planning Quantity: None
SARA HAZARD CLASS:	Immediate: No Delayed: No Pressure: No Reactivity: No Fire: No
SARA ANNUAL REPORT:	Not required
40 CFR PART 68:	Mixture not listed
TSCA:	Calcium hydroxide and sodium hydroxide are listed on the TSCA inventory.
OSHA:	Components of this mixture are not listed in Appendix A.
FDA:	This material is regulated as a medical device.

SECTION 16 - OTHER INFORMATION

NFPA Ratings:	Health = 0 Flammability = 0 Reactivity = 0
Additional Information:	The intended use of this product is as an absorbent for carbon dioxide and other acidic gasses.

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Honeywell

Material Safety Data Sheet

Genetron® MP39 (R-401A)

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Genetron® MP39
OTHER/GENERIC NAMES: R-401A
PRODUCT USE: Refrigerant
MANUFACTURER: Honeywell
101 Columbia Road
Box 1053
Morristown, New Jersey 07962-1053

FOR MORE INFORMATION CALL:
(Monday-Friday, 9:00am-5:00pm)
Product Safety Department
1-800-707-4555

IN CASE OF EMERGENCY CALL:
(24 Hours/Day, 7 Days/Week)
1-800-707-4555 or
Chemtrec 1-800-424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
Chlorodifluoromethane	75-45-6	53
Difluoroethane	75-37-6	13
Chlorotetrafluoroethane	2837-89-0	34

Trace impurities and additional material names not listed above may also appear in Section 15 toward the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Colorless, volatile liquid with ethereal and faint sweetish odor. Non-flammable material. Overexposure may cause dizziness and loss of concentration. At higher levels, CNS depression and cardiac arrhythmia may result from exposure. Vapors displace air and can cause asphyxiation in confined spaces. At higher temperatures (>250°C), decomposition products may include Hydrofluoric Acid (HF) and carbonyl halides such as phosgene.

POTENTIAL HEALTH HAZARDS

SKIN: Irritation would result from a defatting action on tissue. Liquid contact could cause frostbite.

EYES: Liquid contact can cause severe irritation and frostbite. Mist may irritate.

INHALATION: Genetron MP39 is low in acute toxicity in animals. When oxygen levels in air are reduced to 12-14% by displacement, symptoms of asphyxiation, loss of coordination, increased pulse rate and deeper respiration will occur. At high levels, cardiac arrhythmia may occur.

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INGESTION: Ingestion is unlikely because of the low boiling point of the material. Should it occur, discomfort in the gastrointestinal tract from rapid evaporation of the material and consequent evolution of gas would result. Some effects of inhalation and skin exposure would be expected.

DELAYED EFFECTS: None known.

Ingredients found on one of the OSHA designated carcinogen lists are listed below.

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST
No ingredients listed in this section.			

4. FIRST AID MEASURES

SKIN: Promptly flush skin with water until all chemical is removed. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. Get medical attention if symptoms persist.

EYES: Immediately flush eyes with large amounts of water for at least 15 minutes (in case of frostbite water should be lukewarm, not hot) lifting eyelids occasionally to facilitate irrigation. Get medical attention if symptoms persist.

INHALATION: Immediately remove to fresh air. If breathing has stopped, give artificial respiration. Use oxygen as required, provided a qualified operator is available. Get medical attention. Do not give epinephrine (adrenaline).

INGESTION: Ingestion is unlikely because of the physical properties and is not expected to be hazardous. Do not induce vomiting unless instructed to do so by a physician.

ADVICE TO PHYSICIAN: Because of the possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT:	Gas, not applicable per DOT regulations
FLASH POINT METHOD:	Not applicable
AUTOIGNITION TEMPERATURE:	Unknown
UPPER FLAME LIMIT (volume % in air):	None*
LOWER FLAME LIMIT (volume % in air):	None*
	*Based on ASHRAE Standard 34 with match ignition
FLAME PROPAGATION RATE (solids):	Not applicable
OSHA FLAMMABILITY CLASS:	Not applicable

EXTINGUISHING MEDIA:

Use any standard agent - choose the one most appropriate for the type of surrounding fire (material itself is not flammable)

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UNUSUAL FIRE AND EXPLOSION HAZARDS:

Genetron MP39 is not flammable at ambient temperatures and atmospheric pressure. However, this material will become combustible when mixed with air under pressure and exposed to strong ignition sources.
Contact with certain reactive metals may result in formation of explosive or exothermic reactions under specific conditions (e.g. very high temperatures and/or appropriate pressures).

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:

Firefighters should wear self-contained, NIOSH-approved breathing apparatus for protection against possible toxic decomposition products. Proper eye and skin protection should be provided. Use water spray to keep fire-exposed containers cool.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (Always wear recommended personal protective equipment.)

Evacuate unprotected personnel. Protected personnel should remove ignition sources and shut off leak, if without risk, and provide ventilation. Unprotected personnel should not return until air has been tested and determined safe, including low-lying areas.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (Always wear recommended personal protective equipment.)

Avoid breathing vapors and liquid contact with eyes, skin or clothing. Do not puncture or drop cylinders, expose them to open fame or excessive heat. Use authorized cylinders only. Follow standard safety precautions for handling and use of compressed gas cylinders.

Genetron MP39 should not be mixed with air above atmospheric pressure for leak testing or any other purpose. See Section 5: Unusual Fire and Explosion Hazards.

STORAGE RECOMMENDATIONS:

Store in a cool, well-ventilated area of low fire risk and out of direct sunlight. Protect cylinder and its fittings from physical damage. Storage in subsurface locations should be avoided. Close valve tightly after use and when empty.

8. EXPOSURE CONTROL/PERSONAL PROTECTION

ENGINEERING CONTROLS:

Provide local ventilation at filling zones and areas where leakage is probable. Mechanical (general) ventilation may be adequate for other operating and storage areas.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION:

Skin contact with refrigerant may cause frostbite. General work clothing and gloves (leather) should provide adequate protection. If prolonged contact with the liquid or gas is anticipated, insulated gloves constructed of PVA, neoprene or butyl rubber should be used. Any contaminated clothing should be promptly removed and washed before reuse,

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EYE PROTECTION:

For normal conditions, wear safety glasses. Where there is reasonable probability of liquid contact, wear chemical safety goggles.

RESPIRATORY PROTECTION:

None generally required for adequately ventilated work situations. For accidental release or non-ventilated situations, or release into a confined space, where the concentration may be above the PEL of 1,000 ppm, use a self-contained, NIOSH-approved breathing apparatus or supplied air respirator. For escape: use the former or a NIOSH-approved gas mask with organic vapor canister.

ADDITIONAL RECOMMENDATIONS:

Where contact with liquid is likely, such as in a spill or leak, impervious boots and clothing should be worn. High dose-level warning signs are recommended for areas of principle exposure. Provide eyewash stations and quick-drench shower facilities at convenient locations. For tank cleaning operations, see OSHA regulations 29 CFR 1910.132 and 29 CFR 1910.133.

EXPOSURE GUIDELINES:

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
Chlorodifluoromethane	1000 ppm (8hr)	1000 ppm (8 hr)	None
Difluoroethane	None	None	*1000 ppm TWA(8) **1000 ppm TWA (8)
Chlorothetrafluoroethane	None	None	*1000 ppm TWA(8) **1000 ppm TWA (8)

* = Limit established by Honeywell
** = Workplace Environmental Exposure Level (AIHA)
*** = Biological Exposure Index (ACGIH)

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:
Hydrogen Fluoride: ACGIH TLV = 3 ppm ceiling

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Clear, colorless liquid and vapor
PHYSICAL STATE: Gas at ambient temperatures
MOLECULAR WEIGHT: 94.4
CHEMICAL FORMULA: $CHClF_2$
$C_2H_4F_2$
C_2HClF_4
ODOR: Faint ethereal odor
SPECIFIC GRAVITY (water = 1.0): 1.188 @ 25°C (77°F)
SOLUBILITY IN WATER (weight %): .24 wt% @ 25° C and 1 atmosphere
pH: Neutral

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BOILING POINT: -33°C (-27°F)
FREEZING POINT: Unknown
VAPOR PRESSURE: 101.8 psia @ 70°F (bubble); 99.1 psia @ 70°F (dew)
238.3 psia @ 130°F (bubble); 217.9 psia @ 130°F (dew)
VAPOR DENSITY (air = 1.0): 3.5
EVAPORATION RATE: >1 **COMPARED TO:** $CCl_4 = 1$
% VOLATILES 100
FLASH POINT: Not applicable
(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):
The product is stable.
Do not mix with oxygen or air above atmospheric pressure. Any source of high temperature, such as lighted cigarettes, flames, hot spots or welding may yield toxic and/or corrosive decomposition products.

INCOMPATIBILITIES:
(Under specific conditions: e.g. very high temperatures and/or appropriate pressures) - Freshly abraded aluminum surfaces (may cause strong exothermic reaction). Chemically active metals: potassium, calcium, powdered aluminum, magnesium and zinc.

HAZARDOUS DECOMPOSITION PRODUCTS:
Halogens, halogen acids and possible carbonyl halides.

HAZARDOUS POLYMERIZATION:
Will not occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:
LC_{50}: 4 hr. (rat) - ≧300,000 ppm (based on HCFC-22)
Cardiac Sensitization threshold (dog) - greater than or equal to 25,000 ppm (based on HFC-152a)
EC_{50} (rat): Greater than or equal to 140,000 ppm (based on HCFC-124)

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:
Subchronic inhalation (rat) NOEL - 10,000 ppm (HCFC-22)
Chronic NOEL - Greater than or equal to 25,000 ppm (based on HFC-152a)
Not teratogenic
Not mutagenic in *in-vitro* or *in-vivo* tests

OTHER DATA:
Lifetime exposure of male rats was associated with a small increase in salivary gland fibrosarcomas for HCFC-22.

12. ECOLOGICAL INFORMATION

Degradability (BOD): Genetron MP39 is a gas at room temperature; therefore, it is unlikely to remain in water.

Octanol Water Partition Coefficient: Unknown

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13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded?	Not a hazardous waste
If yes, the RCRA ID number is:	Not applicable

OTHER DISPOSAL CONSIDERATIONS:

Disposal must comply with federal, state, and local disposal or discharge laws. Genetron MP39 is subject to U.S. Environmental Protection Agency Clean Air Act Regulations Section 608 in 40 CFR Part 82 regarding refrigerant recycling.

The information offered here is for the product as shipped. Use and/or alterations to the products such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT HAZARD CLASS: US DOT PROPER SHIPPING NAME: Liquefied Gas n.o.s. (Chlorodifluoromethane, Chlorotetrafluoroethane, Difluoroethane).
US DOT HAZARD CLASS: 2.2
US DOT PACKING GROUP: Not applicable

US DOT ID NUMBER: UN3163

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Components listed on the TSCA inventory.

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OTHER TSCA ISSUES: HCFC-124 is subject to a SNUR published in the Federal Register on July 22, 1992 at 57 FR32441. The SNUR codified at 40 CFR 721.3180(a)(2)(i) requires communication of the following:
Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness, or death. Intentional misuse can be fatal. Vapor reduces oxygen available for breathing and is heavier than air. Liquid contact causes frostbite. The effects in animals from single exposure by inhalation include central nervous system effects, anesthesia and decreased blood pressure. Cardiac sensitization occurred in dogs exposed to a concentration of 2.5% in air and given an intravenous epinephrine challenge. Repeated exposures produced increased liver weights, anesthetic effects, irregular respiration, poor coordination and nonspecific effects such as decreased body weight gain. However, no irreversible effects were seen as evidenced by histopathologic evaluation. As part of an extensive toxicology program, halogenated chlorofluorocarbon-124 will be tested* in subchronic, developmental and chronic/cancer studies. Avoid breathing high concentrations of vapor. Use with sufficient ventilation to keep employee exposure below recommended limits. Avoid contact of liquid with skin and eyes. Wear chemical splash goggles and lined butyl gloves. Do not allow product to contact open flame or electrical heating elements because dangerous decomposition products may form.

* PAFT studies on HCFC-124 were completed August, 1995. The tests demonstrated very low acute and subchronic inhalation toxicity. HCFC-124 did not exhibit signs of chronic toxicity, nor did it cause any tumors in a lifetime study. It is not a developmental toxicant, nor is it genotoxic.

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities (TPQs) exist for the following ingredients.

INGREDIENT NAME	SARA/CERCLA RQ (lb.)	SARA EHS TPQ (lb.)
No ingredients listed in this section		

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: IMMEDIATE
PRESSURE

SARA 313 TOXIC CHEMICALS
The following ingredients are SARA 313 "Toxic Chemicals". CAS numbers and weight percents are found in Section 2.

INGREDIENT NAME	COMMENT
Chlorodifluoromethane (HCFC-22)	None
Chlorotetrafluoroethane (HCFC-124)	None

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STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT %	COMMENT
No ingredients listed in this section		

ADDITIONAL REGULATORY INFORMATION:

Genetron MP39 is subject to U.S. Environmental Protection Agency Clear Air Act Regulations at 40 CFR Part 82.

WARNING:

Do Not vent to the atmosphere. To comply with provisions of the U.S. Clear Air Act, any residual must be recovered. **Contains Chlorodifluoromethane and Chlorotetrafluoroethane,** HCFC substances harm public health and the environment by destroying ozone in the upper atmosphere. Destruction of the ozone layer can lead to increased ultraviolet radiation which, with excess exposure to sunlight, can lead to an increase in skin cancer and eye cataracts. **Contains Difluoroethane,** an HFC, a greenhouse gas which may contribute to global warming.

WHMIS CLASSIFICATION (CANADA):

This product has been evaluated in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

FOREIGN INVENTORY STATUS:

Canada - Listed on DSL (HCFC-22 and HFC-152a)
EU - EINECS # 2008719 (HCFC-22)
2008661 (HFC-152a)
2206296 (HCFC-124)

16. OTHER INFORMATION

CURRENT ISSUE DATE: January, 2000
PREVIOUS ISSUE DATE: March, 1998

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:

Section 1: New company name
Section 16: Modified NFPA and HMIS codes

OTHER INFORMATION:

HMIS Classification: Health - 1, Flammability - 1, Reactivity - 0
NFPA Classification: Health - 2, Flammability - 1, Reactivity - 0
ANSI/ASHRAE 34 Safety Group - A1/A1

Regulatory Standards:

1. OSHA regulations for compressed gases: 29 CFR 1910.101
2. DOT classification per 49 CFR 172.101
3. Clean Air Act Class II Substance

Inside back cover

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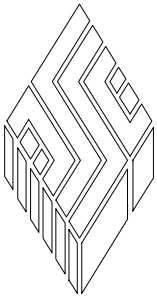
For more information on SSCI's fine line of products and accessories, talk to your SSCI sales representative.



SSCI

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